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A COMPUTER SYSTEM FOR THE REDUCTION, STORAGE AND DISPLAY OF UNDERWAY DATA ACQUIRED AT SEA

by
Manik Talwani

Technical Report No. 1
CU-1-69 N00014-67-A-0108-0004

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PARTICIPATING SCIENTISTS

A number of individuals have helped in the development of this system of programs by contributing programs, by modifying existing programs, by contributing ideas, and by making helpful criticisms. Among them are:

Joan Hastings

Dennis Hayes

James Heirtzler

Ellen Herron

Xavier Le Pichon

Herbert Poppe

Philip Rabinowitz

INTRODUCTION

The principal objective of these programs when first written was to reduce marine geophysical data from their raw form (readings of a strip chart recorder or Precision Depth Recorder) and combine them with ships' navigation information to obtain fully reduced values of the geophysical parameters (free-air gravity, residual magnetic intensity or depth) and the position at which the values were obtained. Subsequently the system grew to incorporate methods for computer adjustment of ships' track, for plotting the values as profiles of various kinds, for annotating the values on Mercator charts, for averaging values over various areas, etc. An extremely important function of our present system is the storage of large amounts of geophysical data and the ability to retrieve them quickly and efficiently

from the random access disk cartridges.

Our present computer installation consists of an IBM 1130 (with a basic cycle time of 2.2 microseconds and a storage capacity of 16k 16-bit words)which includes

(I) Two disk drives which accept interchangeable disk cartridges

(II) Printer, with speed up to 350 lines per minute

(III) Card reader, with speed up to 1000 cards per minute

(IV) Card punch, with speed up to 120 cards per minute and

(V) 30" wide Calcomp digital incremental plotter which plots at 200 steps/second, each step being 1/100 inch.

All the programs described here are in Fortran 2 and have been compiled and run with the IBM 1130 Monitor 2 system.

Thus we have a medium size and speed computer installation with on-line input and output from cards and disk. Our choice of this installation was guided by two prime considerations. Firstly, for a majority of the jobs the output is a graphical plot. To have a very fast computer would mean that for a large part of the time the computer would be waiting for the plotter, a procedure that is wasteful. It is, of course, feasible to use a slower computer than the 2.2 microsecond cycle time IBM 1130. In fact, we had previously used the IBM 1620 MK I, the IBM 1620 MK II and then the 3.6 microsecond cycle time IBM 1130. The change to a faster IBM 1130 was made to speed up data reduction to an optimum level for graphical and analytic work.

Secondly, we find that the interchangeable disk cartridges with random access are quite suited to our needs. Magnetic tape is, of course, cheaper in terms of the amount of information stored, but random access is not possible with it. Non-interchangeable disks or drums allow for faster access times but their total storage capacity is limited and they tend to be more

expensive than interchangeable disks.

An alternative scheme to ours is one that would utilize a computer with a much higher speed and with output on magnetic tape. An off-line plotter would be used for plotting. We have not utilized such a system for three reasons. One, the cost of an off-line plotter system is not appreciably less than that of our computer installation, and it is readily seen that a computer with an on-line plotter is much more useful than an off-line plotter with only a plotter control. Secondly, as will be seen later, we use the computer in many cases as a link between a compact form of data storage and display on a plotter. A very high speed computer which would read data in a certain format from magnetic tape and then essentially write it in a different format on magnetic tape for controlling the plotter will not increase throughput. Thirdly, in our case, output on the plotter is used also in editing and error detection during data processing. Rapid turn-around times are achieved and wastage of machine time is eliminated by having a medium speed computer with an on-line plotter devoted almost entirely to reduction of marine data. In our opinion, a very high speed computer will become useful for processing data such as ours only when a very efficient method of time sharing involving large amounts of data transfer as well as an efficient (for a fast computer) plotter for making plots of large dimensions (30" x 100') on-line, is developed.

The input data for our programs have generally been hand digitized. In some cases we have digitized analog records with an automatic X-Y digitizer. There is no reason why raw data obtained in digital form by a shipboard data-logger could not be utilized.

Again, while we have used the present system in the laboratory, there is

no reason why it could not be used on board a ship. In fact we have used a few of the programs described here for a smaller computer (PDP-8S) and used these on board R/V VEMA and R/V ROBERT D. CONRAD (Talwani, Dorman, and Kittredge, 1969). With some modifications, our system could be made into a real time data acquisition, reduction and display system on board ship. However, we do not favor real time use of computers on board ships for data reduction because, among other factors, we feel that

(a) Unless adequate time-sharing procedures are developed, the computer will not be utilized efficiently

(b) The necessity for editing of data precludes real-time processing

(c) Adjusted navigation essential for the final data reduction can not at present be attained in real time

(d) The system described here can be used on board ship as soon as navigation data are available to complete adjustment of track, which means that final reduced data are available after a few hours of data acquisition, if desired.

It is felt that the most important way to speed up reduction of underway marine data is to develop good digital data logging systems. The data reduction can be done either a few hours later on board ship or a few weeks later in the laboratory. These remarks apply to data with very low sampling rates - a data point every minute or less often. Where data rates of several hundred numbers per second are involved, on line computers with real-time processing may well represent the most efficient method of data handling.

NAVIGATION POINTS

Basic to a large number of programs described here are the navigation data represented by navigation points. A navigation point is defined as a point where a change in speed and/or course of the ship occurs; in other words, the ship's track can be represented by segments at constant course and speed

between navigation points. Since the ship's speed or course is never absolutely constant, one must state how large a change of speed or course is needed to define a navigation point. We have adopted the convention that whenever the ship actively maneuvers, that is, the engine speed or the course steered is varied, a navigation point results. In addition, track adjustment at navigation fixes may result in apparent course and/or speed changes. These are also considered navigation points. Examination of distance covered by the ship through water (by an e.m. log) indicates changes of speed. When the change of speed (through water) exceeds about 0.1 knot, a navigation point is assumed. Finally, our method of interpolation between navigation points makes a flat earth approximation and the navigation points must not be very far apart. Hence additional navigation points are picked so that the distance between them does not exceed about 30 nautical miles.

SIMULTANEOUS INPUT OF NAVIGATION AND GEOPHYSICAL DATA

A large number of our programs utilize navigation data together with raw digitized geophysical data (gravity, topography, or magnetic data) presented as a time series. In all our programs the data are allowed to be at unequal time intervals and there is no requirement that the different data all be read at the same times. The procedure that one would intuitively follow would be to have these input data on cards (paper tape or magnetic tape); to load these into memory; and then to perform the data reduction. Such a procedure calls for a large memory storage and while this is no problem for the very large computers available now, the small computers that we used initially did not have large memory storage capacities. Since in the data reduction the geophysical data corresponding to a particular time

utilized only the navigation data close to that time, it was possible to perform the data reduction without storing all the data in memory. Instead, two separate input devices were used, one for navigation data, the other for the geophysical data. A few geophysical data points were read into the computer core memory together with the navigation points required; the two inputs were used in parallel and thus considerable savings in memory storage were realized. We have carried over this same procedure to our present system where the two inputs are stored on disk and then called for as necessary. It is clear that many modifications of this are possible for other computer systems. It is pointed out, however, that if only one input device (such as a single card reader) is used, the navigation data will have to be stored first in core memory and hence there should be provision for an adequate memory storage capacity.

The specific procedures for loading gravity, topographic, and magnetic data on disk are described in a later section.

STORAGE OF DATA

Originally our output data from the primary reduction programs consisted of one punched card per data point. On this card would be punched the latitude, longitude of the point where the value was obtained together with the value, and such data as distance along track in nautical miles. As our output data accumulated, storage of cards became a problem and we began to look for ways to make the storage format more compact. It is important to realize that the exact form of storage of output data is not important. What is important is that the storage be compact and that it be easily retrievable for programs which display it or use it in other ways. We therefore decided not to store the output data separately at all but to use the stored input data in its raw

form for use in all programs that would have utilized the output data. Compactness is realized because the input data are in a packed form. The machine time for the actual reduction of data is trivial so that no appreciable time is lost in reducing the data each time they are used for any purpose. Our stored data consist of two time series. One series consists of navigation points and gives the ship's position at various times. The other gives the value of the geophysical parameter in its raw form at various times, together with the constants necessary to convert it to the reduced values of the geophysical parameter. Of course, the time series giving the geophysical parameter need not be in their raw form. They could be in their reduced form. The gravity programs, for instance, can use input data in the form of free-air anomalies rather than chart readings. The magnetic programs can use input data in gammas. The reason why we do not usually keep the data in a reduced compact form is that then we would have to store two sets of data (raw and reduced), whereas now we require storage for just one set of data - the input data for use in all our programs.

Some of our programs can also use output data punched one point to a card. These data are generally referred to as answer cards or output cards on the comment cards which describe the programs.

Some specific details of the organization of our data storage are perhaps of interest. The storage of data is by ships' "legs". A three to five week trip from one port to the next constitutes a leg. Two data files each are used for the storage of navigation, gravity, topography, and magnetic data. For VEMA Cruise 24 leg 13, these files are named A2413, B2413 for navigation data; C2413, D2413 for gravity data; E2413, F2413 for topographic data; G2413, H2413 for magnetic data. The exact contents of the files are described later. Take, for instance, an area such as the South Atlantic. Three disk

cartridges (let us call them #2006, #3006, #4006) contain all Lamont data in the South Atlantic. All the navigation files for all the legs of various cruises are loaded on disk cartridge #2006. All the gravity and topography data files are stored on disk #3006. All the magnetics data files are loaded on disk #4006. All the data reduction programs are loaded on disk #2006. Our computer system has two disk drives. By mounting cartridge #2006 on drive 1 (logical drive #0) and #3006 on drive 2 (logical drive #1) all the gravity and topography data in the South Atlantic are available as input into all the programs described here.

NAVIGATION PROGRAMS AND LOADING NAVIGATION DATA ON DISK

As mentioned earlier, navigation data consisting of navigation points are used as input to a large number of data reduction programs. The navigation points are stored on two files (for definition of File see IBM 1130 manual; also see Table I) on disk either by the DSKNV or the FIXPI programs. The data stored are basically the time and position at each navigation point. Time is stored in hours from January 1 of a base year which can arbitrarily be defined for any leg. (Base year is defined by a quantity JBSYR that is read in. Time is reckoned from 00 hrs G.M.T. of January 1 of the year JBSYR+1. If no base year data are read in, JBSYR is set=1959.) Latitude and longitude are stored in degrees and fractions. The time zone is also stored so that ship's time can be recovered. If FIXPI program has been used, the speed and direction of ship's drift obtained in the track adjustment procedure are combined into one word (azimuth of drift in degrees times ten plus speed of drift) and also stored. DSKNV program is used when the navigation points are available from an adjusted track. The input to DSKNV is the time and position of navigation points. FIXPI is used when track adjustment is performed by the computer. The input data in this case are "Pitlog points" (which are the

times and pitlog, or e.m. log, distances of points where the ship changed course and/or speed together with the course steered subsequent to the time of the "Pitlog Point") and fix data (which consist of the time and position of fixes obtained by the ship by any method whatsoever). FIXPI uses the usual method of track adjustment - a dead reckoned track is obtained from one fix to the time of the next fix. The difference between the position at the second fix and the dead reckoned position at this time is attributed to a constant "current" between the times of the two fixes. The constant "current" is applied to the navigation points between the two fixes to obtain the adjusted track.

The MGNAV program (listed in Magnetics Programs) is used to determine the value of the regional field as given by Cain et al. (1964) at each navigation point and to store it on the disk file. The purpose of doing so is to be able to obtain the regional field at each magnetics data point by interpolation between navigation points, rather than by an individual calculation at each data point. MGNAV programs require the polynomial coefficients to be available on disk as a stored file. This file CF1 must therefore be stored previously, which is done by a program CCF1. Instead of using the reference field of Cain et al. (1964), it is possible to use the new International Geomagnetic Reference Field adopted in 1968 by using program NIGRF in place of MGNAV and using a different set of polynomial coefficients to load as file CF2.

NVANS program is a check for proper loading of navigation data on disk. It takes its input from the navigation file on disk. The output gives the time, latitude, and longitude of navigation points, distance in nautical miles along the track, speeds and courses between them, and if desired, the regional magnetic field at each navigation point.

ETVOS program also uses the stored navigation data on disk and outputs the Eotvos correction (used in gravity reduction) on the preliminary plot (a plot of gravity and topography used during data reduction for checking purposes).

Programs PLODI and PLTIM also use the navigation data stored on disk and are used to make the distance (at the bottom) and time (at the top) annotations on the final plot (the plot on which reduced values of gravity, topography, and magnetics are displayed in profile form - see Fig. 1).

Program MERN2 (with link to MERN3) is used to plot the ship's track on a mercator chart at any desired scale. Various options with regard to annotations of hour marks, distance, and time are available. The use of MERN2 is demonstrated by two examples. The bathymetric contours in the second example were obtained from DIGM3, a program that is <u>not</u> described in this report.

LOADING GRAVITY, TOPOGRAPHIC, AND MAGNETIC DATA ON DISK

For each leg of the ship we store separately the gravity, topography, and magnetic data. The topography data, for example, consist of a time series that defines PDR readings at various times (not necessarily equally spaced). To take advantage of the fact that some quantities in the time series do not change rapidly, we have introduced "day cards". Punched on the topography day cards are: Day, Month, Year, Time Zone, number of topography data cards (LB) that day, number of points (LC) on the last card, Matthews' Zone number (NMZ) for the ship that day. Following the day card are a number of topography data cards for that day, which in a packed format have time (hr., min.) and depth (nominal fathoms -1/400 sec. reflection time) punched on them. This is followed by the second day card with its

data cards and so on. A blank card terminates the deck. Program MTOPD loads this deck of topography input data; the day cards on to an "E" file (one record per day card - index KS) and the data cards on to an "F" file (one record per data card - index KT). By "E" file we mean that for leg #13 of Cruise 24, the convention adopted is to name the file E2413. Similarly, the "F" file is named F2413. Since the two files are kept separately in storage, it is necessary to store some information on the day cards file to determine which records on the data cards file are on that day. If KT_n is the record number of the first data card on a certain day (m) the number KT_n-1 is also stored as a part of that day record KS_m. To monitor that the data have been stored properly MTOPD prints out a listing of the day record file, that is Day, Month, Year, TZ, LB, LC, NMZ, KT_n-1, KS for each day.

MATZ is used to store the velocity of sound in the various Matthews' zones on disk. This file has, of course, to be stored only once on each disk - and not stored separately for each leg.

MGRAD similarly stores gravity data onto disk on "C" files for day cards and "D" files for the data points. The data point time series consists of time (hr., min.) and strip chart readings. Constants JDIAL, DRR, CF, GZ are needed to convert the strip chart reading JG(I) to a gravity value GRAV by the formula:

$$GRAV=GZ + (JDIAL + JG(I) \times DRR) \times CF \times 0.001$$

The constants are used for Graf-Askania meter data reductions, and are stored as part of the "gravity day" card data. <u>If any of the constants change, a new "gravity day" is defined. Thus, in general, there are more "gravity days" than actual calendar days.</u>

As mentioned earlier, we store our input data not only for data reduction, but also for final data display, plotting, etc. If one starts with reduced

data (gravity values or free-air anomalies) rather than strip chart readings, the program MGRAD is used equally well to store the reduced data. In this case, the constants JDIAL, DRR, CF, GZ are omitted or have different meanings. The programs that employ the stored data have provisions to use constants appropriately.

MMAGD, similarly, stores magnetic data. Again, the "magnetic day" cards store the constants used in the data reduction and a new day card is used whenever any of these constants change. MMAGD is used regardless of whether the input data is in gammas or whether the time T for a number of JCY cycles of the proton precession is measured. In the latter case, the frequency is JCY/T. The time T is measured by counting the number of cycles N for the same time interval of a standard frequency source (let frequency be JOSC in units of hundreds of KC), that is, T = N/(JOSC x 100,000). The two high order digits of the count N are called JCT and stored with the "magnetic day" data; the three low order digits C(J) are stored as the data time series. Thus, total intensity is

$$H = (JOSC \times 100{,}000 \times JCY \times 23{,}48738)/(C(J) + JCT \times 1000)$$

JOSC and JCY also are stored in "magnetic day card records."

If the input data are in gammas, the two high order digits are termed JCT and stored in the "day records" and the three low order digits become C(J) and stored as the data time series. Provision has to be made in the programs that use the stored magnetic data to discriminate between data stored as period or as gammas.

Some details regarding the data storage files are given in Table I.

	File # used in programs	File name designated for data on VEMA Cruise 24 Leg 13	Each record of the file represents	No. of words per record m	No. of records per sector = 320/m =J	Total no. of records on VEMA Cruise 24 Leg 13 n	Sector count $=\frac{n}{J} + 1$	Maximum no. of records allowed
Navigation Programs	1*	B2413	Navigation data for 1 navigation point	15	21	576	29	2500
	3	A2413	Only 1 record is used for total no. nav.pts., etc.	10	-	1	1	1
Gravity Programs	10	C2413	A gravity day card	15	21	58	4	500
	11	D2413	A gravity data card with up to 9 points per card	18	17	302	19	1500
Topography Programs	12	E2413	A topography day card	11	29	34	3	500
	13	F2413	A topography data card with up to 8 points per card	16	20	341	19	2500
Magnetic Programs	15	G2413	A magnetic day card	11	29	197	8	1000
	16	H2413	A magnetic data card with up to 9 points per card	18	17	579	36	8000

* Except FIXPI, which uses File #2 for the navigation file.

Table I. Details of disk files used for data storage.

BASIC GRAVITY, TOPOGRAPHY, MAGNETIC DATA REDUCTION PROGRAMS

The input for these programs consists of the navigation data and the gravity or topography or magnetic data stored on disk. The output consists of printed reduced values and plots at various scales. The printouts are for gravity (GRDSK) day, month, hours and minutes, latitude, longitude, distance along track in miles, distance along track in km, observed gravity, international formula, free-air anomaly, cruise identification, and Eotvos correction. For topography (TPDSK) depth in nominal fathoms, corrected fathoms, and corrected meters and the year are printed instead of gravity data. For magnetics PRMG2 prints out hour and minute, day, month, time zone, latitude, longitude, distance along track in nautical miles, observed magnetic total intensity, theoretical magnetic regional value of field, residual anomaly, last two digits of the year, and cruise identification.

As a part of our standard data reduction procedures we have found it useful to plot the reduced data on preliminary plot form at the fixed scales of 50 nautical miles to the inch and 50 milligals; 500 fathoms; or 500 gammas to the inch. This is also accomplished by the programs GRDSK and TPDSK, and PRMG2. Long profiles are automatically broken up into two parts (this has been called folding) and plotted on top of each other. The zero for the free-air gravity plot lies, for instance, at 8 inches from the bottom of the plot and at 23 inches for the "folded" plot. As mentioned earlier, ETVOS plots the Eotvos correction on the preliminary plot scale. The plots on the same paper of free-air gravity, topography and Eotvos are extremely useful in checking both the gravity and topography data for errors. We generally find that two or three preliminary plots are essential before the data are considered reduced in final form.

Final plots are plotted on specially printed paper by programs GRDSK, TPDSK, and MGFN2. Such a plot is shown in Fig. 1. Navigation data (miles

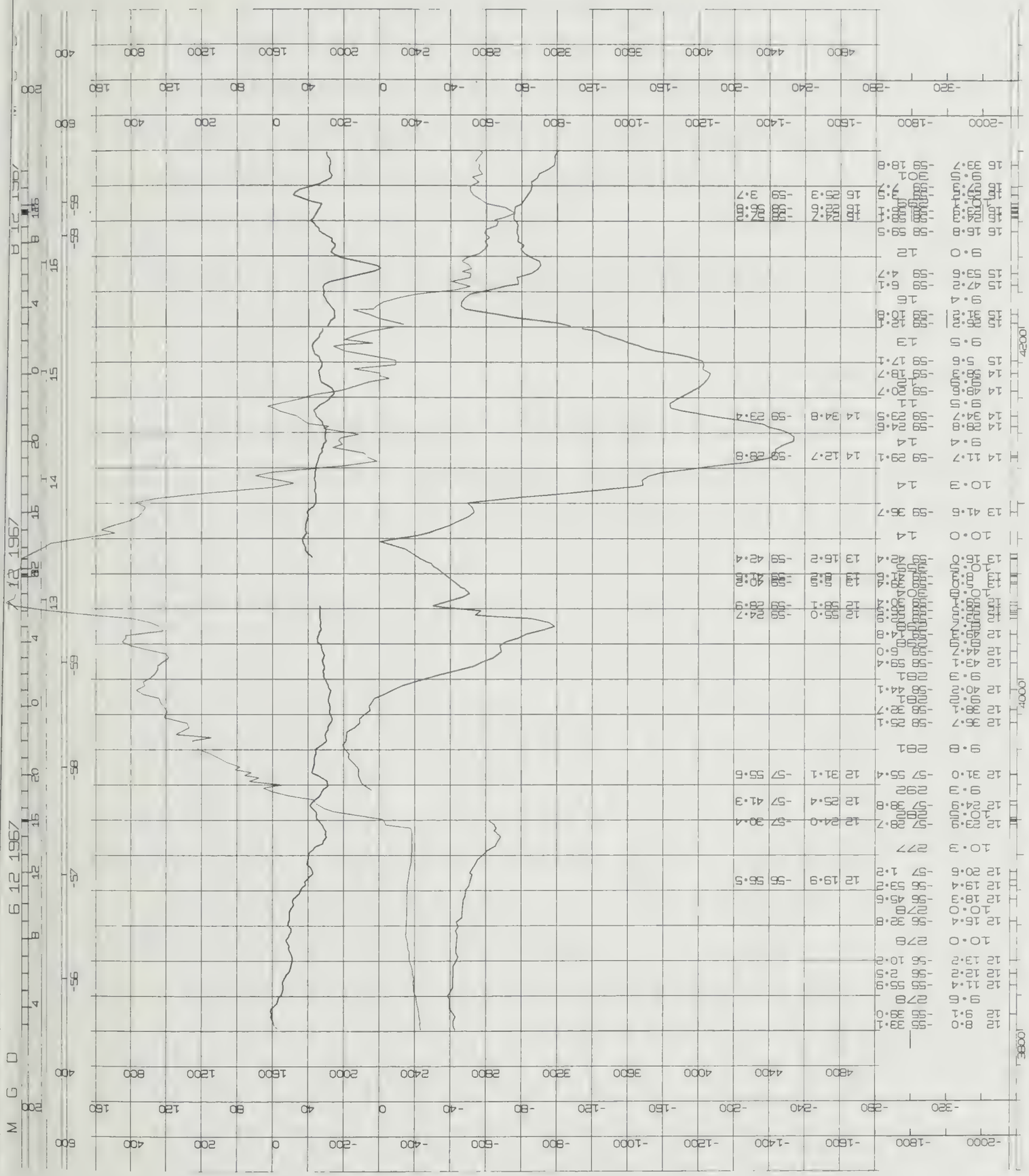


Figure I

Final plot of Depth (finest line), Free-air Gravity and Residual Magnetic Intensity (thickest line) obtained automatically by the on-line plotter, using programs PLODI, PLTIM, GRDSK, TPDSK, and MGFN2. Original scale of the plot is 1" = 20 milligal = 200 nominal fathoms = 100 gammas = 20 nautical miles. Scales for Gravity, Depth, and Magnetics are marked G, D, and M Respectively. Program PLODI and PLTIM describe the other annotations.

and time, etc.) are also plotted on the final plot by programs PLODI and PLTIM. The scales are always kept the same for the final plots; however, the zeros for gravity and magnetics are shifted to avoid confusion between individual traces. (Prefinal plots are plotted by programs GRDSK, TPDSK, and PRMG2; these plots are merely scaled down versions of the final plot and are used to determine the optimum zero shifts for gravity and magnetics.)

The residual magnetic anomaly is used in all these plots. It is computed by interpolating a regional value between values computed for the regional field at navigation points and stored on the navigation file by the program MGNAV (or NIGRF). Two points should be noted. It is obvious that the regional magnetic field file must be established by MGNAV (or NIGRF) before the PRMG2 or MGFN2 can be used. Secondly, the procedure described above achieves considerable savings of time at trivial sacrifice of accuracy ($\pm$ 1 gamma) over other methods in which the regional value of the magnetic field is computed at each data point.

BOUG uses the input gravity and topography data disk files and computes the simple Bouguer anomaly at all points where gravity values have been obtained. The printed output includes the free-air and Bouguer anomalies and the corrected depth in meters as well as the depth in nominal fathoms at the points where gravity data were obtained.

Note that for all the data reduction programs the positions for the geophysical data points are obtained by interpolation between navigation points; <u>hence there must be no geophysical data points earlier than the first navigation point or later than the last navigation point.</u>

Subroutine DMAG2 is used in all the magnetic data reduction programs. Its function is to read the navigation and the magnetic data and do the magnetic reduction to obtain the position and the residual and total intensity

values. The corresponding functions in the gravity and topography programs have not been separated out into subroutines (as they well might have been) but are repeated explicitly in every program.

PROGRAMS FOR ANNOTATION OF GRAVITY, TOPOGRAPHY, OR MAGNETIC VALUES ON MERCATOR CHARTS

Programs MGRA4 (with link to MGRA5), METC8 (with link to METC9), and MGGG8 (with link to MGGG9) respectively, annotate gravity, topography, or magnetic values on Mercator charts. The inputs are identical to the inputs used for the basic data reduction programs. The outputs are annotated values on the Mercator charts at any desired scale. There are options in METC8 to annotate nominal fathoms or corrected meters and in MGGG8 to annotate residual (in gammas) or total intensity magnetic anomalies (in tens of gammas).

METC2 (with link to METC3) is a modification of the topography annotation program METC8 for use in contouring. A contour interval is specified; the position of every multiple of the contour interval is interpolated and represented by a tick mark along the track. If the contour interval is 50 fms, then the tick marks corresponding to every 500 fms are annotated. Annotations are also made where reversal of slope makes the tick marks ambiguous. Again if, for example, the interval is 50 fms and the interpolated depths are 1450, 1500, 1550, 1600, 1650, 1700, 1750, 1800, 1850, 1900, 1950, 2000, and 2050 fms the regular annotations are at 1500 and 2000 fms and in addition the second time any interpolated sounding is repeated, that is, the <u>second</u> 1650 is also annotated.

All the above programs use links. In each case the first of the linked programs merely draws the Mercator grids and stores the variables necessary for the Mercator plots. The links are devices for saving storage. Note that

both of the linked programs call for input cards.

The subroutine MERGR is used by all the annotation programs except METC2.

PROGRAMS FOR PLOTTING OF GRAVITY, TOPOGRAPHY, OR MAGNETIC VALUES AS PROFILES ALONG SHIP'S TRACK ON MERCATOR CHARTS

Programs MGRA6 (with link to MGRA7), METC6 (with link to METC7) and MGGG2 (with link to MGGG3) respectively, plot profiles of free-air gravity, depth and residual magnetic field intensity along the ship's track. In plotting the profiles the following choice is available. Either one can plot values along a direction perpendicular to the ship's track, or along a fixed azimuth. For example, let the ship's track run through 10N 5E in a NE direction and the gravity value at this point be 100 mgal to be plotted at 100 mgals to the inch. If the first alternative is taken, a point corresponding to the gravity value will be plotted 1" NW of 10N 5E on the Mercator chart. If the second choice is taken, the point is plotted at 1" along azimuth THET (read in as data) from 10N 5E.

The inputs for these programs are identical to the inputs used for the basic data reduction programs. There is an option in the METC6 program to use either uncorrected fathoms or corrected meters for the plot.

The subroutine MERGP is used in the above programs. It has options which allow the plotting of the track itself and indication by crosses on the plot of the times at which navigation points occur.

PROGRAMS FOR OBTAINING PROJECTED PROFILES OF GRAVITY, TOPOGRAPHY, OR MAGNETIC VALUES

Programs NAGS1, NATS2, and MGPR2 respectively project values of free-air gravity, depth, and residual magnetic field intensity along a line which passes through a specified point at a specified azimuth.

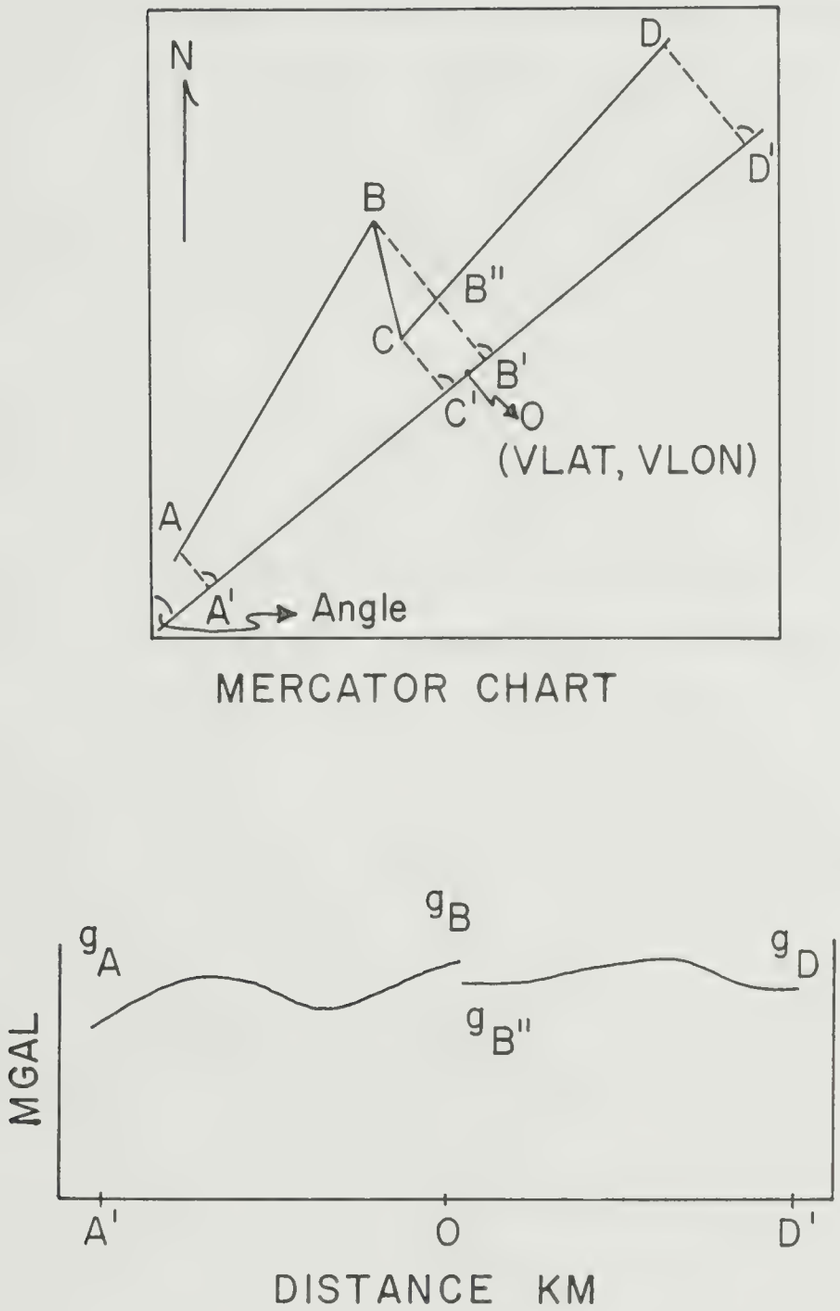


Figure 2

Fig. 2 (top) shows a Mercator chart with ship's track ABCB"D. The line on which one wants to project, say, the gravity values is drawn through O (VLAT, VLON) with azimuth ANGLE. The gravity value g_A at A is projected to A' and so on. Note that there would be an overlap of projected values for ship's track BCB"; this is avoided through programming and results in the

discrepancy between g_B and $g_{B''}$ in Fig. 2 (bottom). If one wanted to obtain the profile corresponding to CD, for instance, one would have to start the projection at C instead of A by appropriately choosing XMIN (minimum distance along track in nautical miles at which projection starts).

Where the ship's track and point O are within 1° of latitude of each other the flat earth approximation is used. For other cases a correction is applied (see TROJ2 subroutine).

Projected values and projected distances (in km) are printed out and punched out on cards in addition to being plotted.

Subroutine TROJ2 is used in programs NAGS1, NATS2 and MGPR2. The inputs for these programs are identical to the inputs used for the basic data reduction programs.

PROGRAM FOR OBTAINING AND PLOTTING AVERAGE FREE-AIR GRAVITY VALUES

AVFRE is used to average free-air gravity over given sized "squares" of latitude and longitude. Raw gravity data for a ship's leg stored on disk can be used as input data to obtain average values for that leg. The averages are printed out as well as punched out. The punched output cards can themselves be used as input to obtain averages for different legs and for larger squares.

AVPLT is used for plotting the obtained averaged free-air values (output of AVFRE) on a Mercator chart.

SYSTEM SUBROUTINES AND FUNCTIONS

Subroutines and functions used by two or more programs are described here and are listed as system subroutines. Other subroutines are listed together with the corresponding main programs.

Subroutines for calculation of time.

AMAY calls the tables of AM and AY from storage. These are respectively the number of accumulated days in the months of a year and the number of accumulated days in years starting from January 1, 1960. AMAY must be called prior to calling TXX or DXX. TXX computes time to 0000 hours of given day, month, year from January 1 of JBSYR+1. For example, if JBSYR = 1963, times are calculated from January 1 of 1964. DXX operates in reverse fashion to TXX. If the time in hours (and fraction) from a known base year JBSYR+1 is given, DXX calculates the day, month, year, hours, and minutes. Time zone is needed to obtain ship's time rather than G.M.T.

These subroutines are written for years 1960-1970. For years earlier than 1960, programs using TXX will still work; however, application of DXX to times obtained by TXX for these years will yield erroneous dates. For many purposes, this error is inconsequential.

Subroutines for calculation of distance, course, and conversion of degrees and minutes into fractions and vice versa.

COMDI computes the distance between point 1 (Lat=y_1, Long=x_1) and point 2 (Lat=y_2, Long=x_2) by the formula

$$\left((y_2 - y_1)^2 + (x_2 - x_1)^2 \cos^2 \left((y_2 + y_1)/2 \right) \right)^{1/2}$$

Note that this is a formula utilizing a flat earth approximation.

Given a north vector XXN and an east vector XXE, CATAN computes in degrees the azimuth of the resultant vector measured in clockwise sense from the north.

Given a coordinate in degrees and minutes, DEGFR converts it into degrees and fractions. Conversely, DEGMI converts a coordinate in degrees and fractions to degrees and minutes and fractions.

DELON determines a difference in two longitudes so that the absolute value of the difference is always less than 180°, to avoid problems on crossing 180° meridian.

Subroutines for Mercator and other plotting.

MEGRI draws the outline of a Mercator grid, given WLONG, ELONG, SLAT, and ANLAT, the western, eastern, southern, and northern boundaries respectively at any specified scale of SCALE inches per degree longitude for any latitude range between 81N and 81S (provided the width of the map does not exceed 28 1/2"). MEGRI also sets up tables for the dimensioned variable B(J) which is used to convert any latitude to inches for plotting within this grid. It is necessary to call MEGRI before calling MEGRW, ALATI, or ALONG. MEGRW draws inside grids, makes annotations, and draws minute marks. ALATI converts a given latitude to inches for plotting within the grid specified by MEGRI. ALONG similarly converts a given longitude to inches.

The subroutines DECID, MECHA, and MEPLO do not require MEGRI to be called earlier. DECID and MECHA are used in subroutines such as MERGR, which annotates values along a track. DECID is used to decide which side of the track (above, below, left, or right) the annotation should be made for maximum clarity in the annotations. MECHA makes the actual annotations. MEPLO is similar to the IBM subroutine FPLOT; it makes a cross at the plotted point.

Subroutines MERGP, MERGR, and TROJ2.

MERGP is used in programs MGRA6, METC6, and MGGG2 to plot the value of

gravity, depth, or magnetic intensity along the track on a Mercator chart. The value can be plotted at right angles to the track or at a fixed azimuth. In addition, there are options which allow the plotting of the track itself and indicate by crosses on the plot the times at which navigation points occur.

MERGR is used in programs MGRA4, METC8, and MGGG8 to annotate the value of gravity, depth, or magnetic intensity along the track on a Mercator chart.

TROJ2 is used in programs NAGS1, NATS2, and MGPR2 to project values of gravity, depth or magnetic intensity along a line with given azimuth. If this line passes through the origin at VLAT, VLON, and the azimuth is ANGLE (see Fig. 3),

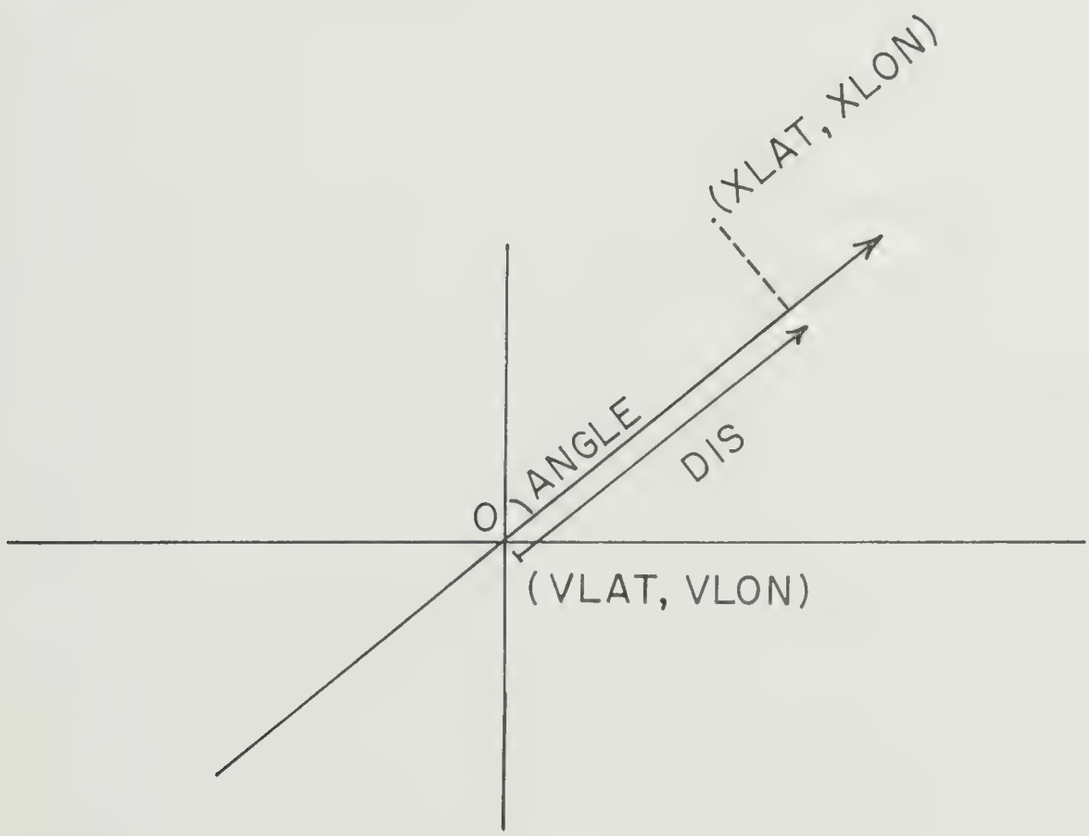


Figure 3.

then the projected distance DIS is given by

$$DIS = DLON \times COS(ANGLE) + DLAT \times SIN(ANGLE)$$

where

$$DLAT = XLAT - VLAT$$

$$DLON = (XLON - VLON) \times COS((XLAT + VLAT)/2) \quad \text{if } DLAT < 1^\circ$$

or

$$DLON = (XLON - VLON) \times (SIN(XLAT) - SIN(VLAT))/(XLAT - VLAT) \quad \text{if } DLAT > 1^\circ$$

zigs in the original track can cause values of DIS to increase and decrease, thus resulting in overlaps in the projected profile. TROJ2 has been programmed in such a way as to eliminate any overlapping by accepting only those projected distances DIS that are in increasing order.

ACKNOWLEDGMENTS

A system of data reduction programs cannot be developed except through feedback from the users of these programs. Help, advice, and support from all the users of these programs at Lamont-Doherty is gratefully acknowledged.

Drummond Matthews modified the program MGNAV which obtains the regional total intensity magnetics fields to NIGRF which uses the new IGRF (1968) field.

I am especially indebted to Joan Hastings, who has contributed in a number of ways to the development and maintenance of this programming system and to the preparation of this report.

In addition to Contract N00014-67-A-0108-0004, support for this work came from Contracts Nonr 266(48) and Nonr 266(79) with the Office of Naval Research as well as from National Science Foundation Grants GP5392, GA1434, GP5536, and GP1415.

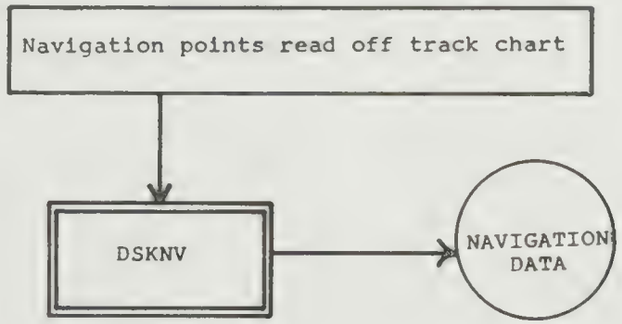
REFERENCES

Cain, J.C., W.E. Daniels, S.J. Hendricks, and D.C. Jensen. NASA REPORT X-612-65-72, 1964.

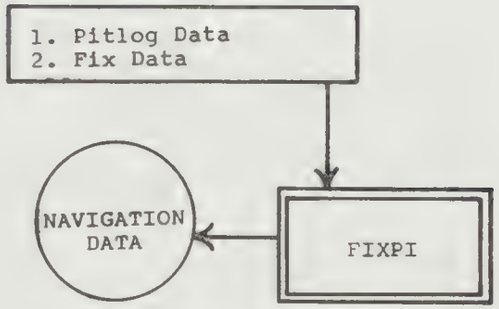
Talwani, M., J. Dorman, and R. Kittredge. Experiences with Computers Aboard Research Vessels VEMA and ROBERT D. CONRAD. Trans. of Applications of Sea-Going Computers, in press.

SUMMARY OF NAVIGATION PROGRAMS

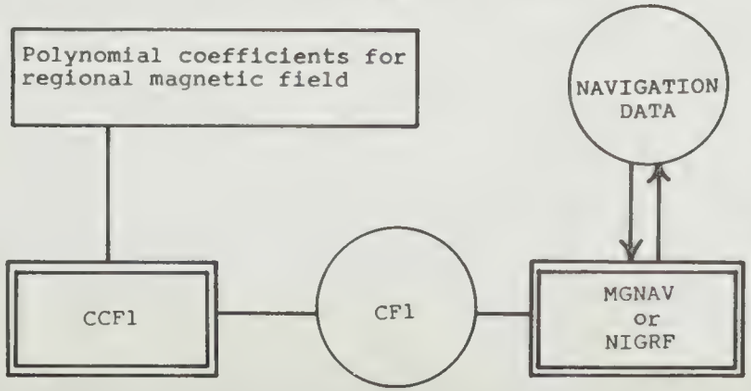
Either DSKNV or FIXPI are used to load navigation data on disk.

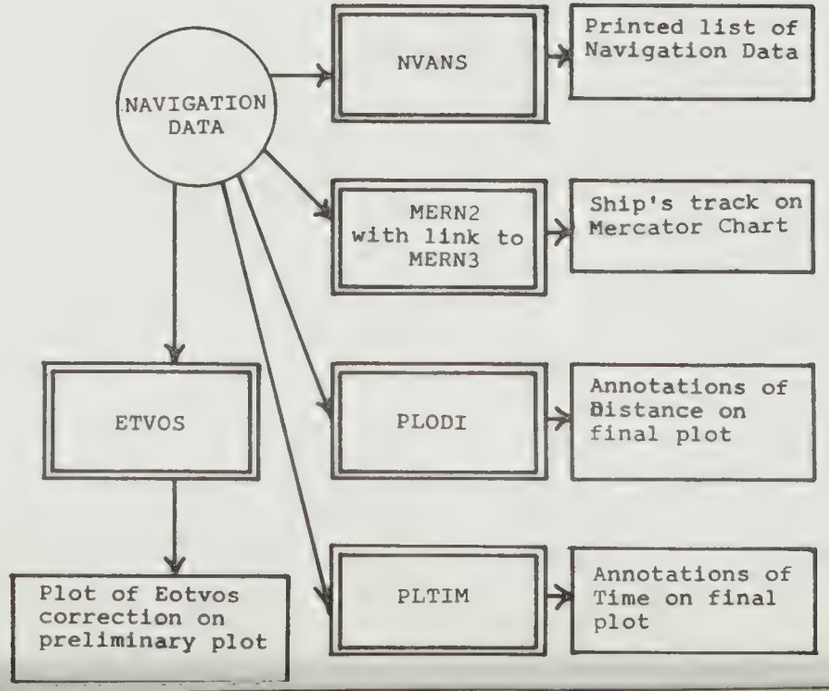


OR



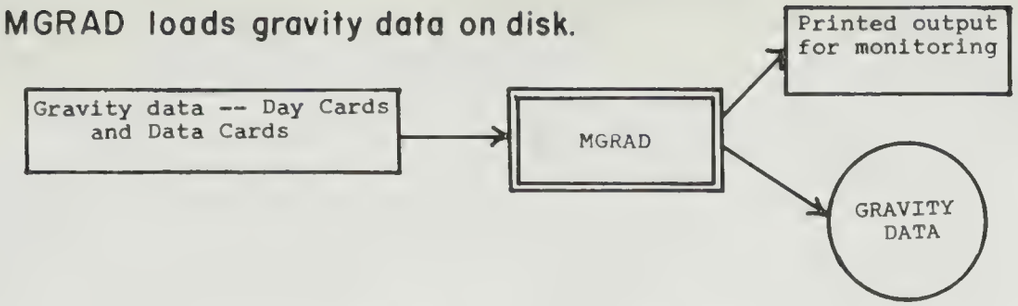
CCFI stores file CFI (polynomial coefficients for computation of regional magnetic intensity) on disk. MGNAV uses CFI file to compute the regional magnetic intensity at navigation data points (from navigation data file on disk) and adds this information to the navigation disk file.



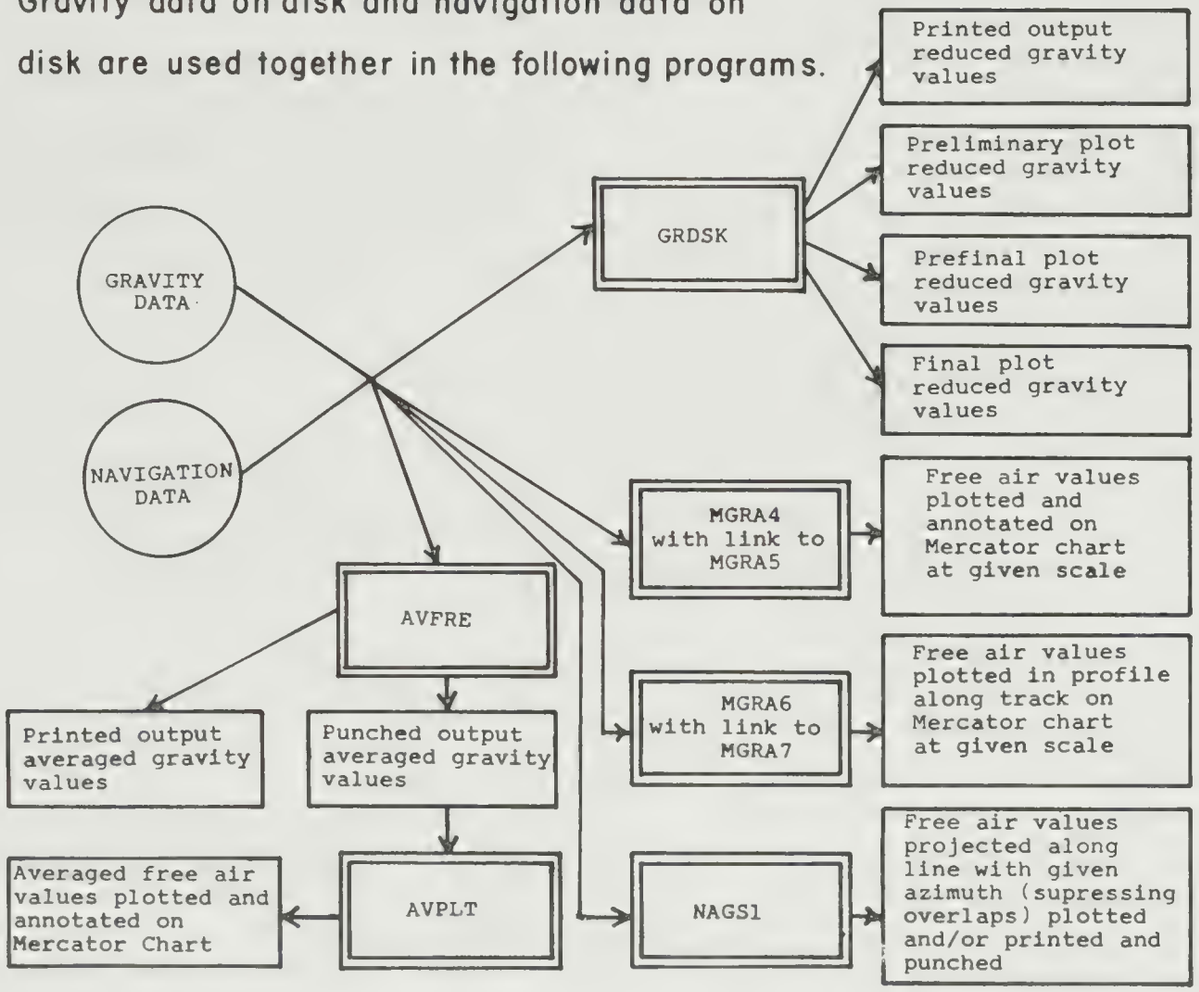


SUMMARY OF GRAVITY PROGRAMS

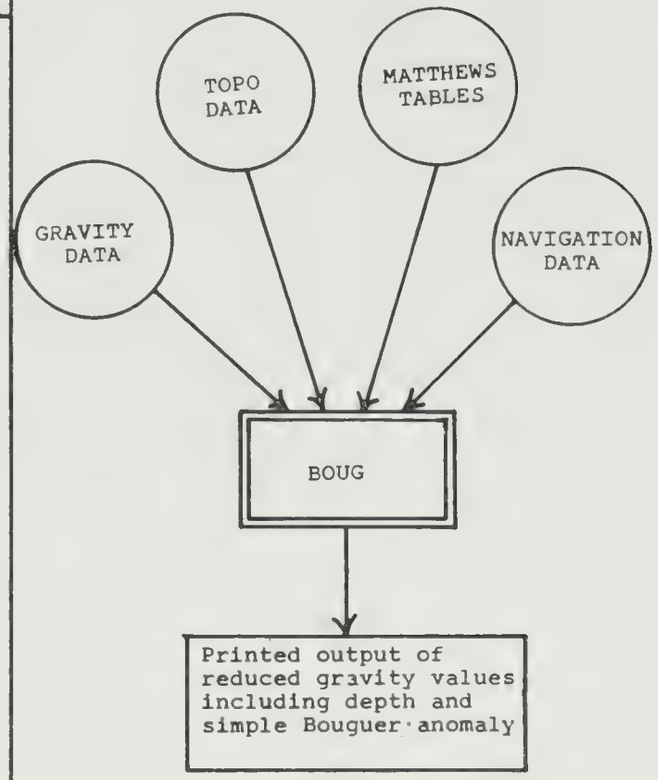
MGRAD loads gravity data on disk.



Gravity data on disk and navigation data on disk are used together in the following programs.

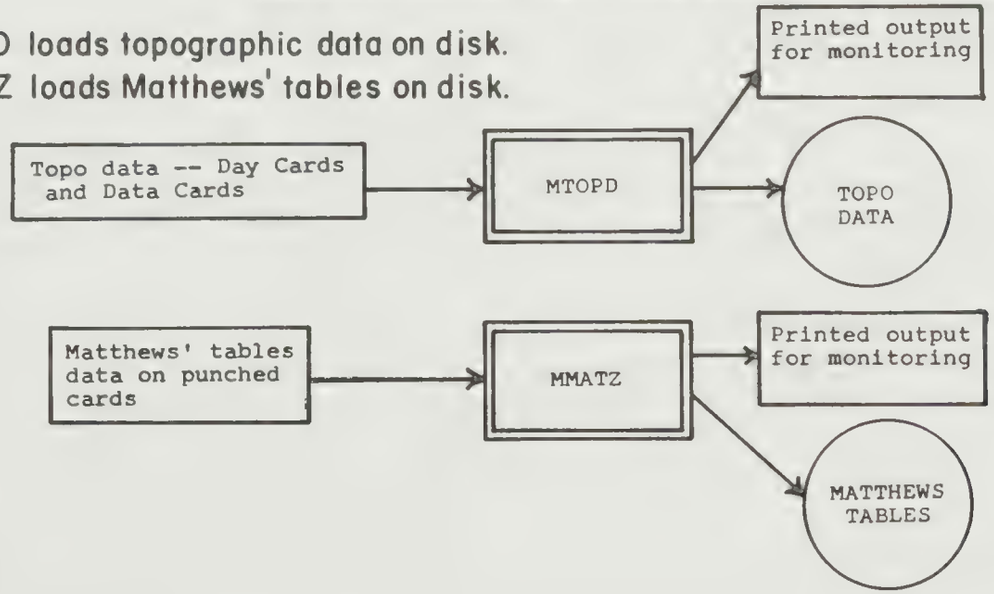


Navigation data, gravity data, topographic data and Matthews' tables on disk are used to compute simple Bouguer anomalies.

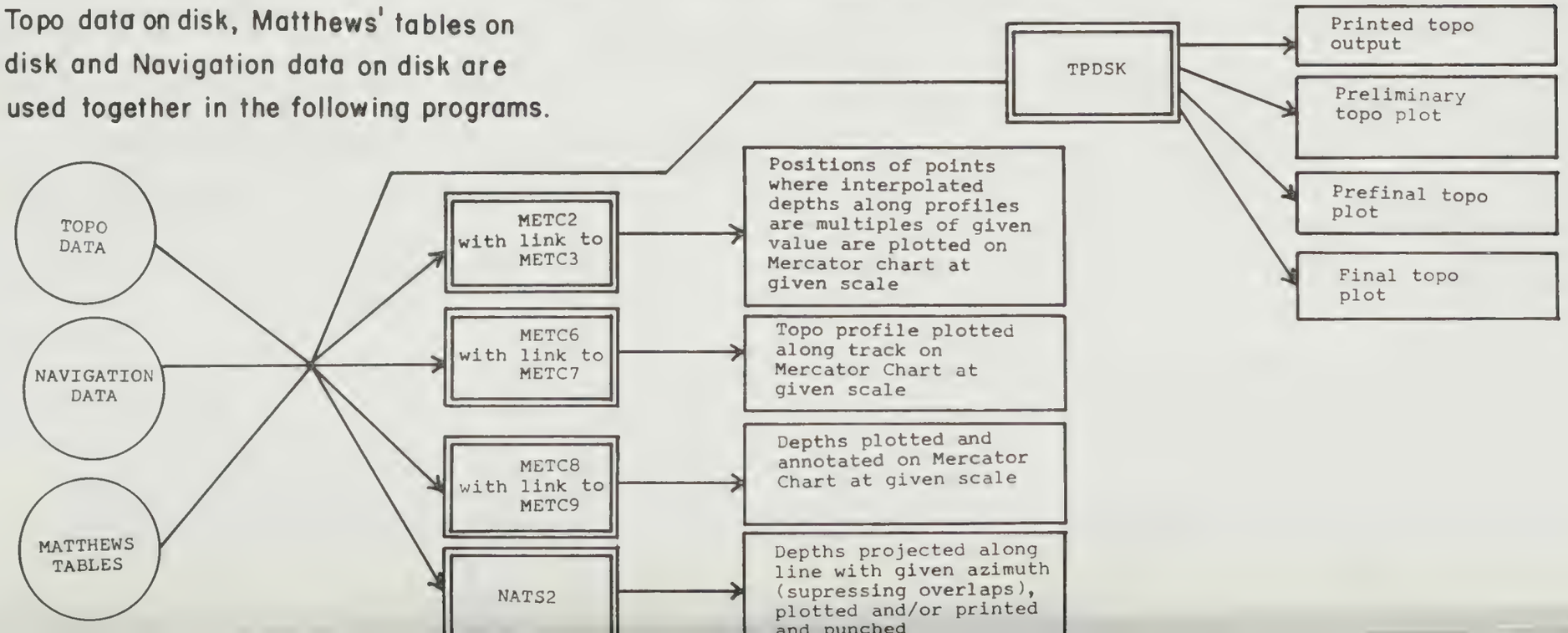


SUMMARY OF TOPOGRAPHY PROGRAMS

MTOPD loads topographic data on disk.
MMATZ loads Matthews' tables on disk.

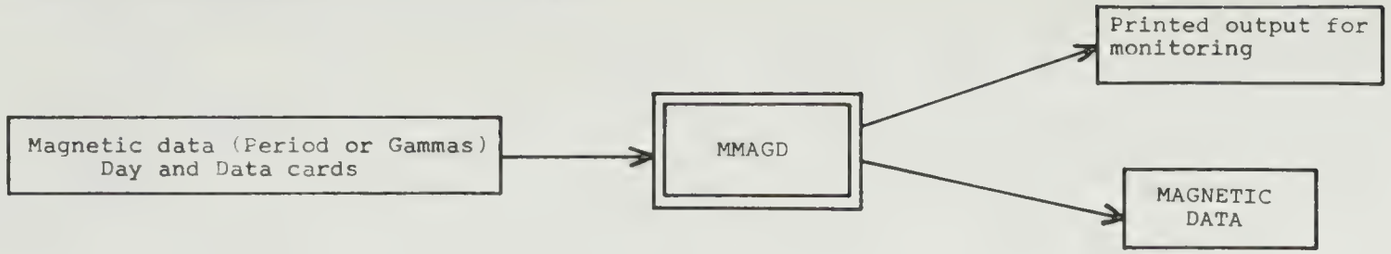


Topo data on disk, Matthews' tables on disk and Navigation data on disk are used together in the following programs.

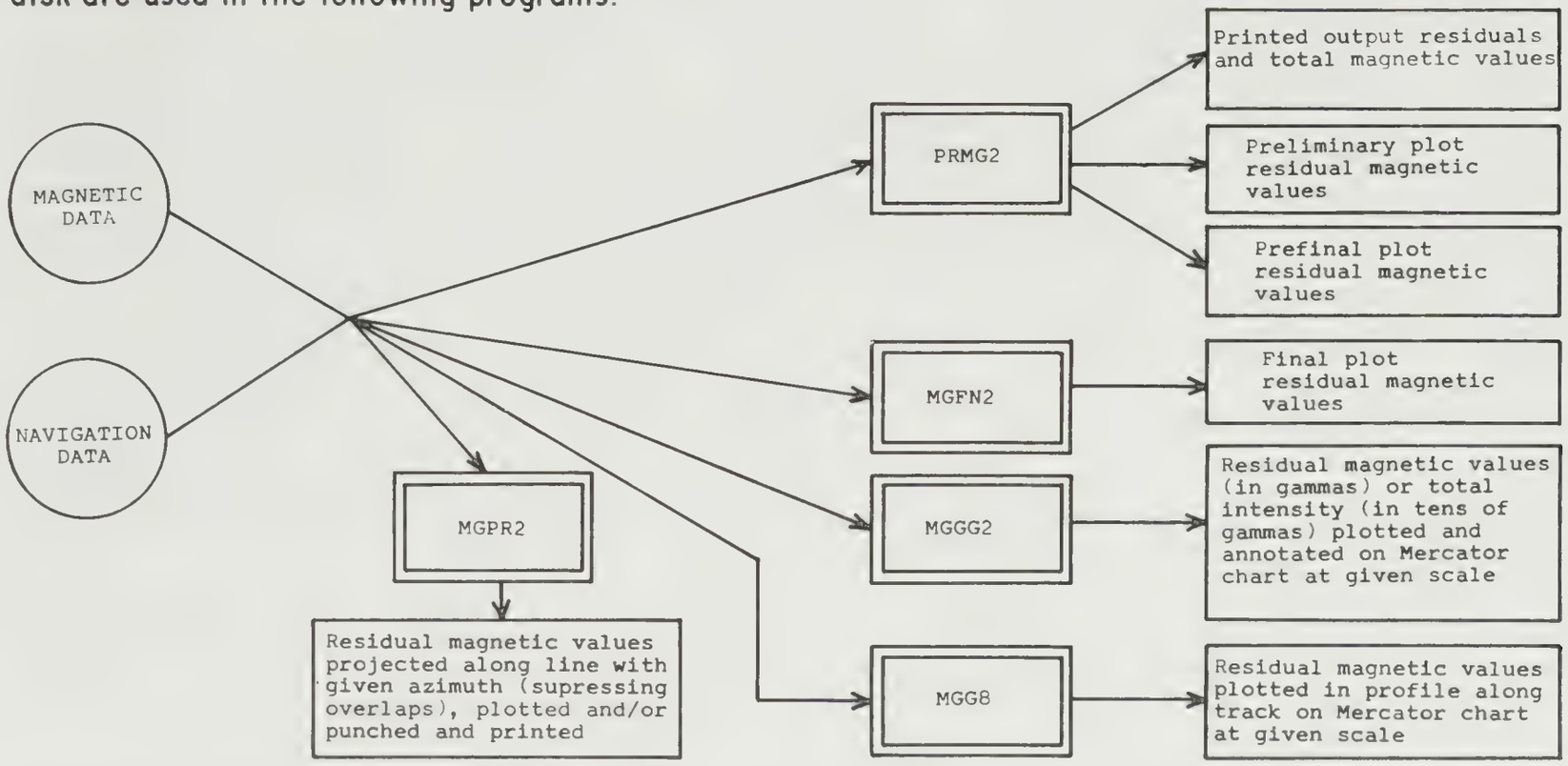


SUMMARY OF MAGNETICS PROGRAMS

MMAGD loads magnetic data on disk.



Magnetic data on disk and navigation data on disk are used in the following programs.



```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2006        2006        0000
                          4006        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*ARITHMETIC TRACE
*TRANSFER TRACE
*LISTALL
*ONE WORD INTEGERS
C DSKNV
C PROGRAM TO LOAD NAVIGATION FILE ON DISK FROM POSITIONS READ OFF CHART.
C NAVIGATION DATA ON CARDS.
C DISTA IS DISTANCE IN N.M. TO FIRST NAV. POINT
C NDAYS IS NUMBER OF NAVIGATION DAYS
C CRUIS IS I.D. FOR CRUISE
C DMAX IS DISTANCE IN N.M. TO LAST NAV. POINT, IF UNKNOWN SET=9999.
C JBSYR IS SET EQUAL TO YEAR IN WHICH CRUISE STARTED.
C FOLLOWING THE FIRST CARD, THE FIRST DAY CARD IS READ, FOLLOWED BY
C NAVIGATION POINTS THAT DAY, FOLLOWED BY SECOND DAY CARD AND SO ON.
C JDAY,MON,JYR,TZ,KK GIVE DAY, MONTH, YEAR, TIME ZONE AND NUMBER OF
C NAVIGATION POINTS THAT DAY.
C THESE DATA ARE PUNCHED IN EACH DAY CARD
C KHR,MIN GIVE TIME IN HOURS AND MINUTES
C LAT,AT GIVES LATITUDE IN DEGREES AND MIN
C LONG, ONG GIVES LONGITUDE IN DEGREES AND MIN
C ABOVE DATA FOR EACH NAVIGATION POINT
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3(1,10,U,INXT)
      DIMENSION AM(12),AY(11)
      COMMON AM,AY
      CALL AMAY
      READ(8,7071)DISTA,NDAYS,CRUIS,DMAX,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=0
      I=0
  805 READ(8,7011)JDAY,MON,JYR,TZ,KK
      SETE=0.0
  503 M=M+1
      K=0
 2005 AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
  202 READ(8,702)KHR,MIN,LAT,AT,LONG,ONG
      K=K+1
      PIN=MIN
      HR=KHR
      TT=AA+HR+PIN/60.
```

```
      PAT=LAT
      PONG=LONG
      IF(PAT)212,213,213
  212 PT=PAT-AT/60.
      GO TO 214
  213 PT=PAT+AT/60.
  214 IF(PONG)215,216,216
  215 PL=PONG-ONG/60.
      GO TO 92
  216 PL=PONG+ONG/60.
   92 I=I+1
      WRITE(1'I)TT,PT,PL,SETE,TZ
      IF(K-KK)202,27,27
   27 IF(M-NDAYS)805,91,91
   91 WRITE(3'1)DISTA,I,DMAX,CRUIS,JBSYR
  702 FORMAT(I2,I2,I4,F5.2,I5,F5.2)
 7011 FORMAT(I2,I3,I5,F5.0,1X,I4)
 7071 FORMAT(F10.3,I5,A4,F10.3,I5)
      WRITE(5,1000)
 1000 FORMAT(18H NAVIGATION STORED)
      CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2 DISTA(R )=000E      CRUIS(R )=0010       DMAX(R )=0012         TZ(R )=0014
  SETE(R )=0016         AA(R )=0018         AT(R )=001A        ONG(R )=001C        PIN(R )=001E         HR(R )=0020
    TT(R )=0022        PAT(R )=0024       PONG(R )=0026         PT(R )=0028         PL(R )=002A       INXT(I )=002E
 NDAYS(I )=002F      JBSYR(I )=0030          M(I )=0031          I(I )=0032       JDAY(I )=0033        MON(I )=0034
   JYR(I )=0035         KK(I )=0036          K(I )=0037        KHR(I )=0038        MIN(I )=0039        LAT(I )=003A
  LONG(I )=003B

UNREFERENCED STATEMENTS
 503     2005

STATEMENT ALLOCATIONS
 702  =0047  7011 =004E  7071 =0055  1000 =005B  7002 =0095  7001 =009C  7003 =00A0  805  =00A8  503  =00B9  2005 =00C3
 202  =00CC  212  =0108  213  =0112  214  =011A  215  =011F  216  =0129  92   =0131  27   =014C  91   =0153

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    TXX     FDIV    FLD     FSTO    FSBR    SFAR    SIAR    FLOAT   TYPEZ   SIIF    SFIF    CARDZ   WCHRI   READZ
 SRED    SWRT    SCOMP   SFIO    SIOF    SIOI    PRNZ    SDFIO   SDWRT   SDCOM   SDF     SDI

REAL CONSTANTS
  .000000E 00=003C    .600000E 02=003E

INTEGER CONSTANTS
     8=0040   1959=0041   1970=0042      0=0043      1=0044      3=0045      5=0046
```

```
CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES     60  PROGRAM    298

 END OF COMPILATION
```

CONTROL CARDS
AND INPUT

```
// JOB
// DUP
*STOREDATA  WS  UA  A2001    1
*STOREDATA  WS  UA  B2001    3
// XEQ DSKNV    1
*FILES(1,B2001),(3,A2001)
```

```
1.00000000   12 V20  2400.000
13 02 1964  +05.  06
1320  40 27.0 -073 48.5
1443 +40 20.7 -073 42.0
1600 +40 13.5 -073 36.0
2000 +39 47.0 -073 10.9
2100 +39 39.8 -073 03.2
2200 +39 30.7 -072 55.0
14 02 1964  +05.  08
0000 +39 13.0 -072 38.1
0139 +39 05.8 -072 31.2
0405 +38 47.4 -072 14.3
1000 +38 05.6 -071 34.9
1630 +37 19.0 -070 51.2
1700 +37 14.3 -070 50.5
2000 +36 47.9 -070 46.1
2200 +36 30.5 -070 43.3
15 02 1964  +05.  04
0000  36 14.0 -070 41.5
0553  35 27.0 -070 21.5
1200 +34 32.5 -069 53.0
1800 +33 38.5 -069 26.0
16 02 1964  +05.  03
0000  32 43.5 -068 58.0
0600 +31 58.0 -068 16.0
1233  31 09.5 -067 32.5
17 02 1964  +04.  04
0100  31 11.0 -067 25.0
0613 +30 31.0 -066 51.0
1200 +29 43.7 -066 12.2
1820  28 54.5 -065 31.5
```

```
18 02 1964  004.  04
0000  28 09.5 -064 55.0
0610  27 28.0 -064 08.0
1305 +26 43.5 -063 17.3
2030 +26 44.4 -063 17.6
19 02 1964  004.  03
0551  25 46.0 -062 12.0
1506  24 46.5 -060 58.5
1917  24 49.5 -060 58.0
20 02 1964  004.  05
0200  23 59.0 -059 59.0
0539  24 17.0 -059 16.5
0650 +24 24.0 -059 03.4
1630  25 30.0 -057 26.0
1815  25 13.0 -057 29.0
21 02 1964  +04.  07
0000 +24 13.5 -057 37.5
0540  23 12.5 -057 46.0
1200 +22 03.0 -057 56.0
1500 +21 29.6 -058 00.0
1800  20 56.5 -058 05.0
2300  19 55.0 -058 12.5
2325  19 50.0 -058 13.5
22 02 1964  +04.  06
0538  20 15.0 -059 23.0
1830  21 18.0 -061 44.5
1900  21 18.0 -061 44.5
2230 +21 34.7 -062 22.0
2340 +21 21.7 -062 24.0
2355 +21 18.4 -062 25.0
23 02 1964  004.  07
0550 +20 17.5 -062 33.9
0738 +20 01.7 -062 36.0
1227 +19 35.0 -063 15.7
1430 +19 22.0 -063 34.0
1917 +19 05.0 -064 28.9
2140 +19 04.6 -064 28.1
2300  19 00.0 -064 43.0
24 02 1964  004.  02
0400  18 39.0 -065 40.0
0603  18 32.5 -066 03.0
```

NAVIGATION STORED

OUTPUT

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2006        2006        0000
                          4006        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
*ONE WORD INTEGERS
C ETVOS
C PLOTS ON PRELIMINARY PLOT SCALE THE EOTVOS FOR ENTIRE LEG, USING DATA
C FROM NAVIGATION FILE ON DISK.
C DAY AND HOUR OF FIRST NAVIGAITON POINT OF EACH DAY IS ANNOTATED.
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DIMENSION AM(12),AY(11)
      COMMON AM,AY
      CALL AMAY
      LLDAY=0
      LDAY=0
      LYR=0
      LHR=0
      LMIN=0
      MMM=0
      MM=0
      MEOT=0
      IIII=0
      KR=1
      KI=0
      JI=0
 4011 MEOT=MEOT+1
      EOT2=0
      EOT1=0
      DIST1=0
      DIST2=0
      KR=1
      IIII=0
      CALL FPLOT (1,0.0,0.0)
   20 READ(3'1)DISTA,I,DMAX,CRUIS,JBSYR
      IF(JBSYR-1959)9001,9002,9002
 9002 IF(JBSYR-1970)9003,9003,9001
 9001 JBSYR=1959
 9003 CONTINUE
  750 CALL SCALF(.02,1.,0.0,0.0)
      L=L-1
      XMAX=DMAX+1.
      LMAX2=XMAX/200
      AMAX2=LMAX2*100
   60 IF(XMAX-2000.)84,84,83
   84 AMAX2=6000.
```

```
      GO TO 90
   83 XF=XMAX
      MXF=XF
      JK=MXF/100.
      JL=100*JK
      IF(JL-MXF)4100,4101,4101
 4100 MXF=JL+100
 4101 JX=MXF/2
      AMAX2=JX
   90 IIII=IIII+1
      READ(1'IIII)TT,PT,PL,SETE,TZ
  217 GO TO (218,219,219),KR
  218 KR=2
      TNAV1=TT
      PLAT1=PT
      PLNG1=PL
      SET1=SETE
      DIST1=DISTA
      DISK=DIST1*1.85325
      GO TO 90
  219 TNAV2=TT
      PLAT2=PT
      PLNG2=PL
      SET2=SETE
      S1=PLAT1*60.
      S2=PLAT2*60.
      Q=(PLAT1+PLAT2)/2.
      CQ=FCOS(Q/57.29578)
      DELW=PLNG2-PLNG1
      IF(DELW)2191,2192,2193
 2191 IF(180.+DELW)2194,2194,2192
 2194 DELW=360.+DELW
      GO TO 2192
 2193 IF(DELW-180.)2192,2195,2195
 2195 DELW=DELW-360.
 2192 DELW=DELW*60.*CQ
      DIS=FSQRT((S2-S1)*(S2-S1)+DELW*DELW)
      DIST2=DIST1+DIS
      DISK=DIST2*1.85325
  226 IF(S2-S1)31,32,33
   32 IF(DELW)37,38,38
   38 COUR=90.
      GO TO 40
   37 COUR=270.
      GO TO 40
   31 GOOD=DELW/(S2-S1)
      GOOD=FATAN(GOOD)
      COUR=GOOD*57.29578+180.
      GO TO 40
   33 COUR=FATAN(DELW/(S2-S1))*57.29578
   40 IF(COUR)34,39,39
```

```
   34 COUR=COUR+360.
   39 JCOUR=COUR+.5
      DELT=TNAV2-TNAV1
      SPEE2=DIS/DELT
   81 EOT2=.0075*CQ*DELW/DELT
   82 FOT=1000.*EOT2
   88 X=DIST1
      Y=EOT2*1000.
      KUKU=1
      GO TO 4045
 4044 X=DIST2
      Y=EOT2*1000.
      KUKU=2
 4045 IF(X-AMAX2)4133,4133,4134
 4134 X=X-AMAX2
      Y=23.+Y/50.
      GO TO 4137
 4133 Y=8.+Y/50.
 4137 IF(MM)7005,7001,7005
 7001 CALL FPLOT(-2,X,Y)
 1701 MM=MM+1
      GO TO 7003
 7005 CALL FPLOT(0,X,Y)
      GO TO(1701,1702),KUKU
 1702 CALL DXX(TNAV2,TZ,LDAY,LMON,LYR,LHR,LMIN,JBSYR)
      IF(LDAY-LLDAY)1703,1701,1703
 1703 XBT=X+2.5
      YBT=Y-0.8
      LHR=LHR*100+LMIN
      CALL FCHAR(XBT,YBT,0.1,0.1,1.57079)
      WRITE(7,1704)LDAY,LHR
 1704 FORMAT(I3,I5)
      LLDAY=LDAY
      CALL FPLOT(-2,X,Y)
 7003 GO TO (4044,4041),KUKU
 4041 IF(IIII-I)225,666,666
  225 PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      DIST1=DIST2
      SPEE1=SPEE2
      SET1=SET2
      EOT1=EOT2
      GO TO 90
  666 CALL FPLOT(1,0.0,0.0)
   66 CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2  EOT2(R )=000E       EOT1(R )=0010       DIST1(R )=0012       DIST2(R )=0014
 DISTA(R )=0016       DMAX(R )=0018      CRUIS(R )=001A       XMAX(R )=001C       AMAX2(R )=001E          XF(R )=0020
    TT(R )=0022         PT(R )=0024         PL(R )=0026       SETE(R )=0028          TZ(R )=002A       TNAV1(R )=002C
```

```
 PLAT1(R )=002E      PLNG1(R )=0030      SET1(R )=0032      DISK(R )=0034      TNAV2(R )=0036      PLAT2(R )=0038
 PLNG2(R )=003A       SET2(R )=003C        S1(R )=003E        S2(R )=0040          Q(R )=0042         CQ(R )=0044
  DELW(R )=0046        DIS(R )=0048      COUR(R )=004A      GOOD(R )=004C      DELT(R )=004E      SPEE2(R )=0050
   FOT(R )=0052          X(R )=0054         Y(R )=0056       XBT(R )=0058       YBT(R )=005A      SPEE1(R )=005C
  INXT(I )=0064      LLDAY(I )=0065      LDAY(I )=0066       LYR(I )=0067       LHR(I )=0068       LMIN(I )=0069
   MMM(I )=006A         MM(I )=006B      MEOT(I )=006C      IIII(I )=006D        KR(I )=006E         KI(I )=006F
    JI(I )=0070          I(I )=0071     JBSYR(I )=0072         L(I )=0073     LMAX2(I )=0074        MXF(I )=0075
    JK(I )=0076         JL(I )=0077        JX(I )=0078     JCOUR(I )=0079      KUKU(I )=007A       LMON(I )=007B

UNREFERENCED STATEMENTS
 20      750     60      217     226     81      82      88      66

STATEMENT ALLOCATIONS
 1704 =00B5  4011 =0103  20   =012A  9002 =013D  9001 =0143  9003 =0147  750  =0147  60   =0169  84   =0170  83   =0176
 4100 =0194  4101 =019A  90   =01A6  217  =01B9  218  =01C0  219  =01E0  2191 =021C  2194 =0223  2193 =022B  2195 =0232
 2192 =0238  226  =0267  32   =0270  38   =0275  37   =027B  31   =0281  33   =0298  40   =02A7  34   =02AC  39   =02B2
 81   =02C5  82   =02CF  88   =02D5  4044 =02E5  4045 =02F3  4134 =02FA  4133 =030A  4137 =0312  7001 =0316  1701 =0320
 7005 =0328  1702 =0333  1703 =0343  7003 =0375  4041 =037B  225  =0381  666  =039F  66   =03A4

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    FPLOT   SCALF   FCOS    FSQRT   FATAN   DXX     FCHAR   FSUB    FMPY    FDIV    FLD     FSTO    FDVR    IFIX
 FLOAT   TYPEZ   CARDZ   WCHRI   READZ   SWRT    SCOMP   SFIO    SIOI    PRNZ    SDFIO   SDRED   SDF     SDI

REAL CONSTANTS
  .000000E 00=007C    .200000E-01=007E    .100000E 01=0080    .200000E 04=0082    .600000E 04=0084    .100000E 03=0086
  .185325E 01=0088    .600000E 02=008A    .200000E 01=008C    .572957E 02=008E    .180000E 03=0090    .360000E 03=0092
  .900000E 02=0094    .270000E 03=0096    .500000E 00=0098    .750000E-02=009A    .100000E 04=009C    .230000E 02=009E
  .500000E 02=00A0    .800000E 01=00A2    .250000E 01=00A4    .800000E 00=00A6    .100000E 00=00A8    .157079E 01=00AA

INTEGER CONSTANTS
     0=00AC      1=00AD      3=00AE   1959=00AF   1970=00B0    200=00B1    100=00B2      2=00B3      7=00B4

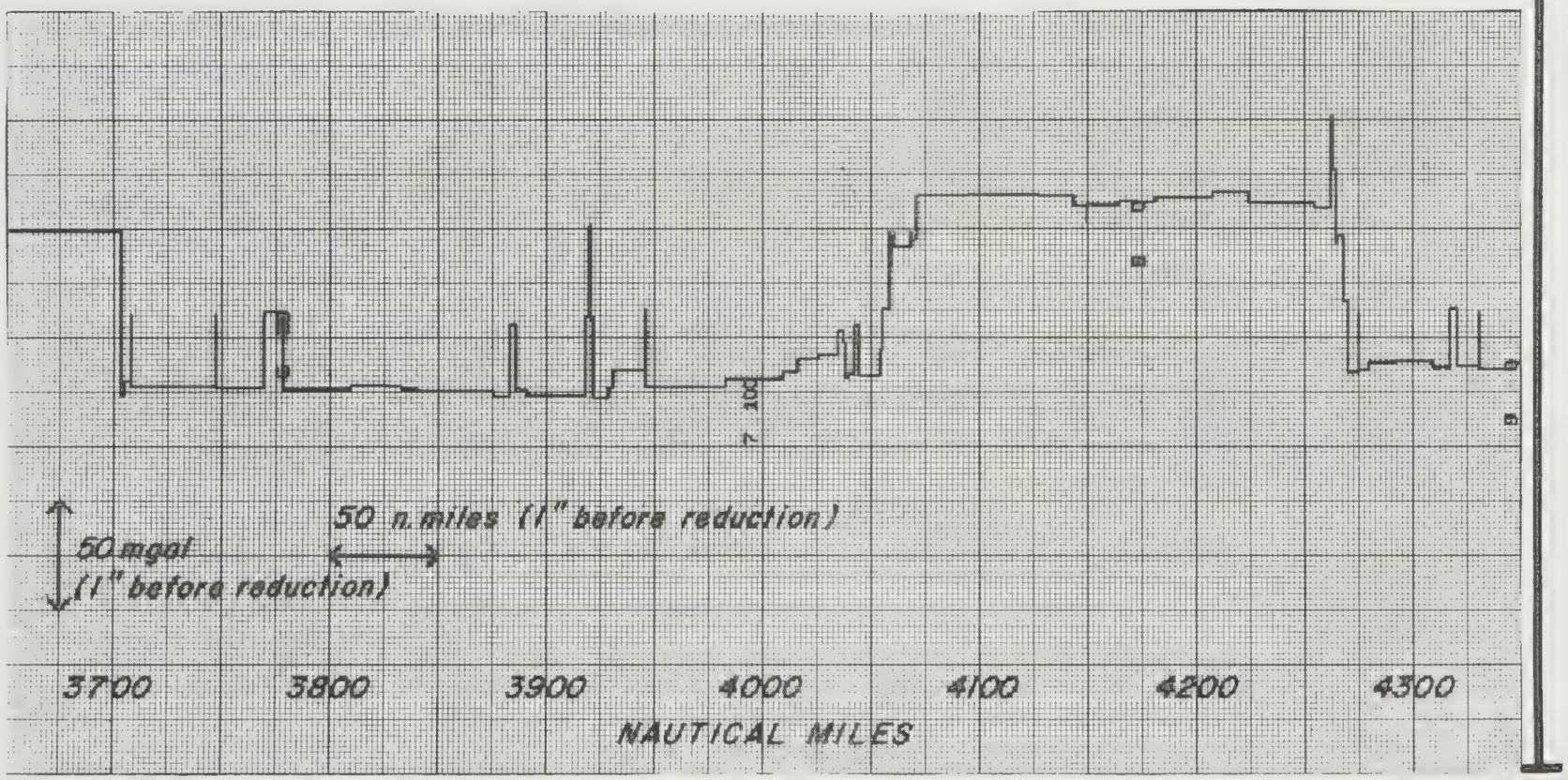
CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    124  PROGRAM    810

 END OF COMPILATION
```

```
// JOB
// XEQ ETVOS     1
*FILES(1,B2413),(3,A2413)
```

CONTROL CARDS
AND INPUT

OUTPUT



```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2006        2006        0000

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*LISTALL
*TRANSFER TRACE
*ARITHMETICTRACE
*ONE WORD INTEGERS
C FIXPI
C ADDITIONAL SUBROUTINE ECTV
C GIVEN PITLOG DATA (TIME, MILEAGE, COURSE) AND FIX DATA (TIME, LAT,
C LONG),FIXPI MAKES TRACK ADJUSTMENT AND PRINTS AND/OR WRITES
C NAVIGATION POINTS ON DISK
C NSS1 IS NON ZERO TO WRITE NAVIGATION POINTS ON DISK
C NSS2 IS ZERC TC PRINT NAVIGATION POINTS
C NSS3 IS ALWAYS NON ZERO
C NSS4 IS ZERC
C NSS5 IS ZERC IF FIX CARDS ARE REAC WITH FORMAT 7110
C NSS5 IS NON ZERC IF FIX CARDS ARE READ WITH FORMAT 711
C CRUIS IS CRUISE I.D.
C LQ IS ZERO
C JBSYR IS BASE YEAR. FOR DEFINITION SEE SUBROUTINE TXX.
C AN INITIAL POINT WITH COORDINATES (KLAT,ATT) (KLONG,ONGG) AND THE
C DISTANCE AT THIS POINT DISTA ARE READ IN.
C SUBSEQUENT DISTANCES ALONG TRACK ARE MEASURED FROM HERE.
C UNLESS THE LEG IS BEING BROKEN UP INTO SECTIONS IT IS CUSTOMARY TO SET
C DISTA=0, AND MAKE THE FIRST FIX THE INITIAL POINT.
C DISTZ IS SET=0.
C A CERTAIN TIME SEQUENCE IS NECESSARY IN THIS PROGRAM.
C THE FIRST FIX MUST BE PRECEDED BY ONE AND ONLY ONE PITLOG POINT.
C THE LAST FIX MUST BE FOLLOWED BY AT LEAST ONE PITLOG POINT.
C ALL THE PITLOG POINTS ARE READ-THEN ALL THE FIXES.
C NDAY IS NUMBER CF PITLOG DAYS.
C PER IS FRACTION BY WHICH PITLOG OVERREADS, THAT IS CORRECT READING IS
C READING*(1.-PER)
C KJDAY,KMON,KJYR,TTZ,KK REFER RESPECTIVELY TO DAY,MONTH,YEAR,TIME
C ZONE, AND NUMBER OF PITLOG POINTS FOR A PITLOG DAY.
C KKHR AND KMIN ARE HOUR AND MINUTES PER PITLOG POINT
C PLOG2 IS THE MILEAGE AND JCSE IS THE COURSE STEERED AFTER THE PITLOG
C POINT.
C A CCURSE OF 500 IS USED AT STATIONS, COMM ARE ALPHAMERIC COMMENTS AT
C PITLOG PCINTS.
C EACH FIX CARD HAS JDAY(DAY), MON(MONTH), JYR(YEAR), GTZ(TIME ZONE),
C KHR(HOUR), MIN(MINUTES), LAT,AT(LATITUDE IN DEGREES AND MINUTES),
C LONG,ONG(LONGITUDE IN DEGREES AND MINUTES), AND NFIX(FIX NO.) AND
C FCOMM (ALPHAMERIC) COMMENTS PUNCHED ON IT.
C PRINTED OUTPUT GIVES, DAY, MONTH, YEAR, TIME ZONE, LATITUDE(DEGREES,
C MINUTES), LONGITUDE(DEGREES,MINUTES), NUMBER OF MILES AND KM(ALONG
```

```
C TRACK), SPEED AND COURSE MADE GOOD, DRIFT SPEED AND AZIMUTH, D.R.
C SPEED AND COURSE, FIX NO., AND COMMENTS.
      DEFINE FILE 1(2000,10,U,INXT)
      DEFINE FILE 2(2500,15,U,INXT)
      DEFINE FILE 3(1,10,U,INXT)
      DEFINE FILE 4(2,7,U,INXT)
      DEFINE FILE 5(1,7,U,INXT)
      DEFINE FILE 6(2000,2,U,INXT)
      DIMENSICNSN(99),SE(99),SPEED(99),CSE(99),XCOMM(99),
     1PLAT(99),PLON(99),TFIX(2),JDAY(2),MON(2),JYR(2),GTZ(2),KHR(2),
     2MIN(2),LAT(2),AT(2),LONG(2),ONG(2),LA(2),SLAT(2),SLON(2),WN(99),
     3WE(99),AM(12),AY(11),SFLAT(2),SFLON(2),NFIX(2),TZ(99),FCOMM(2)
      COMMCN AM,AY
      READ(8,2)NSS1,NSS2,NSS3,NSS4,NSS5,CRUIS ,LQ,JBSYR
      IF(JBSYR)7002,7001,7002
 7001 JBSYR=1959
 7002 CONTINUE
    2 FORMAT(5I2,A4,I6,I5)
      IF(NSS3)100,101,100
  101 READ(4'1)LQ,DISTA,XXLAT,XXLON
      GC TC 102
  100 READ(8,1701)DISTA,KLAT,ATT,KLONG,ONGG,DISZ
 1701 FORMAT(F8.1,I4,F5.1,I5,F5.1,F8.1)
      XXLAT=DEGFR(KLAT,ATT)
      XXLON=DEGFR(KLONG,ONGG)
      ECT=0.0
  102 CALL AMAY
      JJDY=0
      JJMCN=0
      JJYR=0
      JJH=C
      JJMIN=0
      INC=C
      SPC=0.0
      SETE=0
      XXE=0.0
      XXN=0.0
      XXD=0.0
      NNL=0
      XXL=0.0
      LS=0
      L=0
      M=0
      KTL=1
      DPLOG=0.0
      READ(8,900)NDAYS,PER
  900 FORMAT(I5,F7.2)
      PERT=1.-PER
  200 M=M+1
      READ(8,901)KJDAY,KMCN,KJYR,TTZ,KK
  901 FORMAT(I2,I3,I5,F5.1,I4)
```

```
      KKK=0
      AA=TXX(KJDAY,KMON,KJYR,TTZ,JBSYR)
  201 L=L+1
      READ(8,902)KKHR,KMIN,PLOG2,JCSE,COMM
  902     FORMAT(I2,I2,F8.1,1XI6,5XA4)
      PLOG2=PLOG2*PERT
      GO TO (4001,4002),KTL
 4002 DPLOG=PLOG2-PLOG1
 4001 PLOG2=PLOG2-DPLOG
      IF(JCSE-360)4003,4003,4004
 4003 KTL=1
      GO TO 4005
 4004 KTL=2
 4005 CONTINUE
      PIN=KMIN
      HR=KKHR
      TLOGL=AA+HR+PIN/60.
      WRITE(6'L)TLOGL
      IF(L-1)2031,2031,2032
 2032 LM1=L-1
      READ(6'L)TLOGL
      READ(6'LM1)TLOGM
      SPD=(PLOG2-PLOG1)/(TLOGL-TLOGM)
 2031 WRITE(1'L)JCSE,TTZ,SPD,COMM
      PLOG1=PLOG2
      KKK=KKK+1
      IF(KK-KKK)2017,2017,201
 2017 IF(NDAYS-M)203,203,200
  203 LG=L
      KTOT=L
      N=1
      K=1
C     READ FIX AND COMPUTE TFIX(N)
  601 IF(NSS5)7200,7201,7200
 7200 READ(8,711)JDAY(N),MON(N),JYR(N),GTZ(N),KHR(N),MIN(N),LAT(N),AT(N)
     1,LONG(N),ONG(N),NFIX(N),FCOMM(N)
  711 FORMAT(I2,I3,I5,F5.2,1X,2I2,I4,F6.2,I4,F6.2,6X,I4,20X,A1)
      GO TO 7202
 7201 READ(8,7110)JDAY(N),MON(N),JYR(N),GTZ(N),KHR(N),MIN(N),LAT(N),AT(N
     1),LONG(N),ONG(N),NFIX(N),FCOMM(N)
 7110 FORMAT(I2,I3,I5,F5.2,1X,2I2,I4,F5.2,I5,F5.2,I11,2XA4)
 7202 IF(JDAY(N))6012,6013,6012
 6012 SLAT(N)=DEGFR(LAT(N),AT(N))
      SLON(N)=DEGFR(LONG(N),ONG(N))
      HR=KHR(N)
      PIN=MIN(N)
      TFIX(N)=TXX(JDAY(N),MON(N),JYR(N),GTZ(N),JBSYR)+HR+PIN/60.
C     FIND PITLOG POINT JUST AFTER FIX
      DO 801 KK=K,KTOT
      READ(6'KK)TLOKK
      IF(TFIX(N)-TLOKK)606,606,801
```

```
  801 CONTINUE
  606 L=KK
      LA(N)=L
      IF(N-1)607,607,608
  607 N=N+1
      GO TO 601
  608 IF(LA(N)-LA(1))6075,6075,610
 6075 LH=L-1
      LB=LA(1)-1
      WN(1 )=60.*(SLAT(2)-SLAT(1))/(TFIX(2)-TFIX(1))
      Q=FCOS(((SLAT(2)+SLAT(1))/2.)/57.29578)
      RLON=SLON(2)-SLON(1)
      WE(1 )=60.*Q*DELON(RLON)/(TFIX(2)-TFIX(1))
      READ(1'K)JCSE,TTZ,SPD,COMM
      READ(1'KK)JUJU,TTZ,SPD,COMM
      CCE=JCSE
      CCE=CCE/57.29578
      CSE(1)=CCE
      SPEED(1)=SPD
      SETN=WN(1 )-SPD*FCOS(CCE)
      SETE=WE(1 )-SPD*FSIN(CCE)
      GO TO 6178
  610 CONTINUE
C     DETERMINE LAT AND LONG FOR EACH PLOG POINT
 6173 KG=K+1
      LH=L-1
      LL=L-2
      KR=LH-K +1
      DO 6174 KK=K ,L
      READ(1'KK)JCSE,TTZ,SPD,COMM
      KQ=KK-K +1
      CSE(KQ)=JCSE
      CSE(KQ)=CSE(KQ)/57.29578
      TZ(KQ)=TTZ
      XCOMM(KQ)=COMM
      IF(KQ-1)6174,6174,6175
 6175 SN(KQ-1)=SPD*FCOS(CSE(KQ-1))
      SE(KQ-1)=SPD*FSIN(CSE(KQ-1))
      SPEED(KQ-1)=SPD
 6174 CONTINUE
 6177 DO 802 KK=KG,LH
      KQ=KK-KG+2
      IF(KK-KG)401,401,402
  401 S=SLAT(1)
      X=SLON(1)
      T=TFIX(1)
      GO TO 6101
  402 S=PLAT(KQ-1)
      KKM1=KK-1
      READ(6'KKM1)TKKM1
      T=TKKM1
```

```
      X=PLCN(KQ-1)
 6101 READ(6'KK)TLOKK
      PLAT(KQ)=S+SN(KQ-1)*(TLCKK-T)/60.
      Q=FCOS(((S+PLAT(KQ))/2.)/57.29578)
      PLCN(KQ)=X+SE(KQ-1)*(TLCKK-T)/(Q*60.)
  802 CONTINUE
C     CALCULATE SET
 8021 NA=2
      READ(6'LH)TLOLH
      SFLAT(NA)=PLAT(KR)+SN(KR)*(TFIX(NA)-TLOLH)/60.
      Q=FCOS(((SFLAT(NA)+PLAT(KR))/2.)/57.29578)
      SFLCN(NA)=PLON(KR)+SE(KR)*(TFIX(NA)-TLOLH)/(Q*60.)
      SETN=(SLAT(NA)-SFLAT(NA))/(TFIX(NA)-TFIX(1))*60.
      RLON=SLCN(NA)-SFLON(NA)
      SETE=Q*DELON(RLON)/(TFIX(NA)-TFIX(1))*60.
C     CALCULATE NEW SPEEDS BETWEEN PITLOG POINTS
      DC 804 KK=K,LH
      KQ=KK-K+1
      WN(KQ)=SN(KQ)+SETN
      WE(KQ)=SE(KQ)+SETE
  804 CONTINUE
C     CALCULATE NEW POSITIONS FOR PITLOG POINTS
      DC 805 KK=KG,LH
      KQ=KK-KG+2
      S=PLAT(KQ)
      X=PLCN(KQ)
 8041 READ(6'KK)TLOKK
      PLAT(KQ)=S+SETN*(TLCKK-TFIX(1))/60.
      Q=FCOS(((S+PLAT(KQ))/2.)/57.29578)
      PLON(KQ)=X+SETE*(TLCKK-TFIX(1))/(Q*60.)
  805 CONTINUE
C     CALCULATE SET DIRECTION AND TCTAL SET
 6178 SETT=FSQRT(SETN**2+SETE**2)
      KCOUR=CATAN(SETN,SETE)+0.5
       SLCN(1)=DELON(SLON(1))
   72 LQ=LQ+1
      WWW=FSQRT(WN(1)**2+WE(1)**2)+.05
      JCCR=CATAN(WN(1),WE(1))+0.5
      TUTU=SETT+.05
      JUJU=CSE(1)*57.29578+0.5
      PUPU=SPEED(1)+.05
      HR=KHR(1)
      PIN=MIN(1)
      CALL CCMDI(XXLAT,XXLCN,SLAT(1),SLON(1),XXE,XXN,XXD)
      DISTB=DISTA+XXD
      DISTA=DISTB
      CALL DEGMI(SLAT(1),NNL,XXL)
      LLAT=NNL
      AAT=XXL
      CALL DEGMI(SLCN(1),NNL,XXL)
      IF(NSS2)5,4,5
```

```
    4 DISTD=DISTA+.05
      CALL EOTV(LLAT,AAT,WWW,JCCR,EOT)
      WRITE(5,715)JDAY(1),MON(1),JYR(1),GTZ(1),KHR(1),MIN(1),LLAT,AAT,NN
     1L,XXL,DISTD,WWW,JCCR,TUTU,KCOUR,PUPU,JUJU,NFIX(1),FCOMM(1),EOT,LQ
  715 FORMAT(1H ,I2,I3,I5,F5.1,I3,I2,I4,F5.1,I5,F5.1,F8.1,F6.1,I4,F6.1,I
     14,F6.1,I4,I8,1XA5,F10.1,I5)
    5 AA=TXX(JDAY(1),MON(1),JYR(1),GTZ(1),JBSYR)+HR+PIN/60.
      IF(NSS1)3,14,3
    3 DRIFT=KCOUR*10
      DRIFT=DRIFT+TUTU
      WRITE(2'LQ)AA,SLAT(1),SLON(1),DRIFT,GTZ(1)
   14 XXLAT=SLAT(1)
      XXLON=SLON(1)
  615 K=LH
      LULU=LA(1)
      LA(1)=L
      JYR(1)=JYR(2)
      NFIX(1)=NFIX(2)
      FCOMM(1)=FCOMM(2)
      MON(1)=MON(2)
      JDAY(1)=JDAY(2)
      KHR(1)=KHR(2)
      MIN(1)=MIN(2)
      SLAT(1)=SLAT(2)
      SLON(1)=SLON(2)
      TFIX(1)=TFIX(2)
      GTZ(1)=GTZ(2)
      IF(LA(2)-LULU)6153,6153,616
  616 GO TO 9900
 9900 MBEG=KG
      MEND=LH
      MCRP=1
 9901 J=MBEG
 9903 LR=J-KG+2
      READ(6'J)TLCGJ
      CALL DXX(TLCGJ,TZ(LR),JJDY,JJMON,JJYR,JJH,JJMIN,JBSYR)
      JJMM=JJMON
      LQ=LQ+1
      WWW=FSQRT(WN(LR)**2+WE(LR)**2)+.05
      JCCR=CATAN(WN(LR),WE(LR))+0.5
       JUJU=CSE(LR)*57.29578+0.5
      PUPU=SPEED(LR)+.05
      CALL COMDI(XXLAT,XXLON,PLAT(LR),PLON(LR),XXE,XXN,XXD)
      DISTB=DISTA+XXD
      DISTA=DISTB
      CALL DEGMI(PLAT(LR),NNL,XXL)
      LLAT=NNL
      AAT=XXL
      PPON=DELON(PLON(LR))
      CALL DEGMI(PPON,NNL,XXL)
      IF(NSS2)7,6,7
```

```
    6 DISTD=DISTA+.05
      CALL EOTV(LLAT,AAT,WWW,JCCR,EOT)
      WRITE(5,715)JJDY,JJMM,JJYR,TZ(LR),JJH,JJMIN,LLAT,AAT,NNL,XXL,DISTD
     1,WWW,JCCR,TUTU,KCOUR,PUPU,JUJU,LS,XCOMM(LR),EOT,LQ
    7 IF(NSS1)9,8,9
    9 WRITE(2'LQ)TLCGJ,PLAT(LR),PLON(LR),DRIFT,TZ(LR)
      IF(TLCGJ-AA)8,92,8
   92 LQ=LQ-1
    8 J=J+1
      XXLAT=PLAT(LR)
      XXLCN=PLCN(LR)
      IF(J-MEND)9903,9903,9902
 9902 GO TC (6153,9904),MCRP
 6153 N=2
 9904 GC TC 601
 6013 LQ=LQ+1
      TUTU=0.0
      KCOUR=0
      CALL COMDI(XXLAT,XXLON,SLAT(1),SLON(1),XXE,XXN,XXD)
      DISTB=DISTA+XXD
      DISTA=DISTB
      CALL DEGMI(SLAT(1),NNL,XXL)
      LLAT=NNL
      AAT=XXL
      CALL DEGMI(SLON(1),NNL,XXL)
      IF(NSS2)11,10,11
   10 IF(NSS4)11,450,11
  450 DISTD=DISTA+.05
      CALL EOTV(LLAT,AAT,WWW,JCCR,EOT)
      WRITE(5,715)JDAY(1),MON(1),JYR(1),GTZ(1),KHR(1),MIN(1),LLAT,AAT,NN
     1L,XXL,DISTD,WWW,JCCR,TUTU,KCOUR,PUPU,JUJU,NFIX(1),FCOMM(1),EOT,LQ
   11 HR=KHR(1)
      PIN=MIN(1)
      AA=TXX(JDAY(1),MON(1),JYR(1),GTZ(1),JBSYR)+HR+PIN/60.
      IF(NSS1)13,12,13
   13 WRITE(2'LQ)AA,SLAT(1),SLON(1),DRIFT,GTZ(1)
   12 WRITE(3'1)DISZ,LQ,DISTA,CRUIS,JBSYR
      READ(3'1)D,L,DD,C,JBSYR
      WRITE(5,500)D,L,DD,C,JBSYR
  500 FORMAT(1H ,F8.1,I5,1XF8.1,1XA4,I5)
      WRITE(5'1)NFIX(1),FCOMM(1)
      CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2    SN(R )=00EE-002A    SE(R )=01B4-00F0 SPEED(R )=027A-01B6   CSE(R )=0340-027C
 XCOMM(R )=0406-0342  PLAT(R )=04CC-0408  PLON(R )=0592-04CE  TFIX(R )=0596-0594   GTZ(R )=059A-0598    AT(R )=059E-059C
   ONG(R )=05A2-05A0  SLAT(R )=05A6-05A4  SLON(R )=05AA-05A8    WN(R )=0670-05AC    WE(R )=0736-0672 SFLAT(R )=073A-0738
 SFLON(R )=073E-073C    TZ(R )=0804-0740 FCOMM(R )=0808-0806 CRUIS(R )=080A      DISTA(R )=080C      XXLAT(R )=080E
 XXLON(R )=0810        ATT(R )=0812       ONGG(R )=0814       DISZ(R )=0816        EOT(R )=0818        SPD(R )=081A
  SETE(R )=081C        XXE(R )=081E        XXN(R )=0820        XXD(R )=0822        XXL(R )=0824      DPLOG(R )=0826
   PER(R )=0828       PERT(R )=082A        TTZ(R )=082C         AA(R )=082E      PLOG2(R )=0830       COMM(R )=0832
```

```
 PLOG1(R )=0834        PIN(R )=0836         HR(R )=0838      TLOGL(R )=083A      TLOGM(R )=083C      TLOKK(R )=083E
     Q(R )=0840       RLON(R )=0842        CCE(R )=0844       SETN(R )=0846          S(R )=0848          X(R )=084A
     T(R )=084C      TKKM1(R )=084E      TLOLH(R )=0850       SETT(R )=0852        WWW(R )=0854       TUTU(R )=0856
  PUPU(R )=0858      DISTB(R )=085A        AAT(R )=085C      DISTD(R )=085E      DRIFT(R )=0860      TLOGJ(R )=0862
  PPON(R )=0864          D(R )=0866         DD(R )=0868          C(R )=086A       JDAY(I )=0871-0870   MON(I )=0873-0872
   JYR(I )=0875-0874   KHR(I )=0877-0876   MIN(I )=0879-0878   LAT(I )=087B-087A  LONG(I )=087D-087C    LA(I )=087F-087E
  NFIX(I )=0881-0880  INXT(I )=0882       NSS1(I )=0883       NSS2(I )=0884       NSS3(I )=0885       NSS4(I )=0886
  NSS5(I )=0887          LQ(I )=0888      JBSYR(I )=0889       KLAT(I )=088A      KLONG(I )=088B       JJDY(I )=088C
 JJMON(I )=088D       JJYR(I )=088E        JJH(I )=088F      JJMIN(I )=0890        IND(I )=0891        NNL(I )=0892
    LS(I )=0893          L(I )=0894          M(I )=0895        KTL(I )=0896      NDAYS(I )=0897      KJDAY(I )=0898
  KMON(I )=0899       KJYR(I )=089A         KK(I )=089B        KKK(I )=089C       KKHR(I )=089D       KMIN(I )=089E
  JCSE(I )=089F        LM1(I )=08A0         LG(I )=08A1       KTOT(I )=08A2          N(I )=08A3          K(I )=08A4
    LH(I )=08A5         LB(I )=08A6       JUJU(I )=08A7        KG(I )=08A8         LL(I )=08A9         KR(I )=08AA
    KQ(I )=08AB       KKM1(I )=08AC         NA(I )=08AD      KCOUR(I )=08AE       JCCR(I )=08AF       LLAT(I )=08B0
  LULU(I )=08B1       MBEG(I )=08B2       MEND(I )=08B3       MORP(I )=08B4          J(I )=08B5          LR(I )=08B6
  JJMM(I )=08B7

UNREFERENCED STATEMENTS
 6173    6177    8021    8041.   72      615     9901

STATEMENT ALLOCATIONS
 2    =08DB  1701 =08E1  900  =08E8  901  =08EB  902  =08F1  711  =08F9  7110 =0909  715  =0918  500  =0931  7001 =096C
 7002 =0970  101  =0975  100  =0982  102  =09A1  200  =09F9  201  =0A19  4002 =0A37  4001 =0A3D  4003 =0A4A  4004 =0A50
 4005 =0A54  2032 =0A79  2031 =0A97  2017 =0AB4  203  =0ABB  601  =0ACB  7200 =0AD0  7201 =0B03  7202 =0B34  6012 =0B3E
 801  =0BEB  606  =0BF4  607  =0C08  608  =0C10  6075 =0C1E  610  =0CBF  6173 =0CBF  6175 =0D15  6174 =0D46  6177 =0D4F
 401  =0D62  402  =0D76  6101 =0D94  802  =0DDB  8021 =0DE4  804  =0E8E  8041 =0EB2  805  =0EF1  6178 =0EFA  72   =0F24
 4    =0FC7  5    =1004  3    =1038  14   =1056  615  =1062  616  =10D3  9900 =10D5  9901 =10E1  9903 =10E5  6    =11BE
 7    =11FE  9    =1203  92   =121D  8    =1223  9902 =123F  6153 =1244  9904 =1248  6013 =124A  10   =129E  450  =12A3
 11   =12EC  13   =1322  12   =1332

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 DEGFR   AMAY    TXX     FCOS    DELON   FSIN    FSQRT   CATAN   COMDI   DEGMI   EOTV    DXX     FADDX   FSUB    FSUBX
 FMPY    FMPYX   FDIV    FLD     FLDX    FSTO    FSBRX   FDVR    FAXI    SFAR    SFARX   SIAR    SIARX   IFIX    FLOAT
 TYPEZ   SIIF    SFIF    SGOTO   WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOFX   SIOIX   SIOF    SIOI    SUBSC
 PRNZ    SDFIC   SDRED   SDWRT   SDCOM   SDFX    SDIX    SDF     SDI

REAL CONSTANTS
  .000000E 00=08C2    .100000E 01=08C4    .600000E 02=08C6    .200000E 01=08C8    .572957E 02=08CA    .500000E 00=08CC
  .500000E-01=08CE

INTEGER CONSTANTS
     8=08D0   1959=08D1      4=08D2      1=08D3      0=08D4    360=08D5      2=08D6      6=08D7      5=08D8     10=08D9
     3=08DA

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES   2242  PROGRAM  - 2724
```

```
 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2006        2006        0000
                          4006        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
      SUBROUTINE EOTV(LLAT,AAT,WWW,JCCR,EOT)
      XLAT=DEGFR(LLAT,AAT)*.01745
      XCCR=JCCR
      XCCR=XCCR*.01745
      EOT=7.5*FSIN(XCCR)*FCOS(XLAT)*WWW
      RETURN
      END
VARIABLE ALLOCATIONS
  XLAT(R )=0000       XCCR(R )=0002

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 DEGFR   FSIN    FCOS    FMPY    FLD     FSTO    FLOAT   SUBIN

REAL CONSTANTS
  .174500E-01=0006    .750000E 01=0008

CORE REQUIREMENTS FOR EOTV
 COMMON      0  VARIABLES      6  PROGRAM     54

 END OF COMPILATION
```

CONTROL CARDS
AND INPUT

```
// XEQ FIXPI     1
*FILES(2,B2413),(3,A2413)
0100010001 V24      0 1967


     0.0 -23 00.9  -43 06.9
   29
17 11 1967 +02.  09
1025   021.4    160       F/A
1031   022.1    110       A/C
1200   035.3    090       A/C
1230   039.9    090       H/A
1248   041.3    090       F/A
1428   056.6    090       H/A
1556   064.5    090       F/A
1900   092.8    090
2200   121.2    090
18 11 1967 +02.  10
0000   140.1    090
0230   163.9    090       H/A
0400   170.2    090       F/A
0700   192.4    090
1051   223.0    090       H/A
1104   223.9    090       F/A
1400   247.4    090
1600   263.7    070       A/C
1900   286.7    070
2130   306.0    070
19 11 1967 +02.  11
0000   325.7    070
0300   348.4    070
0600   369.7    070
0800   383.9    090       A/C
1014   401.8    090       H/A
1039   403.5    500       H/T
1345   403.5    070       H/A
1408   404.9    070       F/A
1800   435.6    070       S/A
1802   435.7    070       F/A
2200   469.0    070
20 11 1967 +02.  11
0000   485.1    070
0300   509.7    070
0600   534.5    070
0900   559.7    070
1037   573.4    180       A/C
1213   589.3    065      A/CS
1235   590.8    065       F/A
```

1325	598.1	500	H/T
1853	599.6	035	H/A
1915	601.3	035	F/A
2200	625.5	035	
21 11	1967 +02.	09	
0000	643.0	035	
0300	669.4	035	
0600	695.8	035	
1000	731.4	035	
1358	767.7	035	S/A
1400	767.8	035	F/A
1800	804.8	035	
2100	832.7	035	S/A
2103	833.0	035	F/A
22 11	1967 +02.	13	
0000	860.5	035	
0300	888.7	035	
0600	916.6	035	
0816	937.6	025	A/C
1100	962.9	025	
1400	990.8	025	
1545	1007.6	025	S/A
1600	1008.6	500	H/T
1852	018.7	345	H/A
1900	019.6	345	F/A
1930	024.2	345	S/A
1934	024.6	345	F/A
2200	048.0	345	
23 11	1967 +02.	12	
0000	067.0	345	
0300	095.5	345	
0600	123.7	345	
0800	142.6	340	A/C
0900	152.0	340	S/A
0903	152.3	340	F/A
1200	180.5	340	
1500	209.5	340	
1800	238.2	340	
1957	256.9	340	S/A
2000	257.1	340	F/A
2200	276.0	340	
24 11	1967 +02.	15	
0000	294.8	340	
0300	323.2	340	
0600	351.9	340	
0900	380.3	350	A/C
1037	395.7	350	H/A
1052	397.1	500	H/T
1102	397.2	350	H/A
1119	398.8	500	H/T
1403	398.8	350	H/A
1412	399.7	350	F/A
1500	407.1	350	S/A

1503	407.4	350	F/A
1800	435.3	350	
2030	459.0	350	S/A
2031	459.1	350	F/A
25 11 1967 +02.		10	
0000	491.9	350	
0300	520.2	350	
0600	548.6	350	
0900	576.7	350	
1200	604.8	350	
1630	646.7	350	S/A
1632	646.8	350	F/A
1800	660.7	350	
2100	689.2	350	S/A
2103	689.4	350	F/A
26 11 1967 +02.		10	
0000	717.7	350	
0300	746.4	350	
0600	775.0	350	
0900	803.8	350	
1200	832.6	350	
1445	859.0	350	H/A
1502	860.4	500	H/T
1800	010.4	355	H/A
1808	011.2	355	F/A
2100	038.3	355	
27 11 1967 +02.		10	
0000	066.5	355	
0300	094.7	355	
0400	104.1	340	A/C
0700	132.7	340	
0830	147.2	330	A/C
1100	171.2	330	
1400	200.1	330	
1700	229.1	330	
2100	267.0	330	S/A
2102	267.1	330	F/A
28 11 1967 +02.		14	
0000	295.9	330	
0300	325.3	330	
0600	354.7	330	
0730	369.2	330	H/A
0747	370.9	330	F/A
0752	371.6	500	H/T
1206	371.7	286	H/A
1230	374.3	286	F/A
1300	379.2	286	H/A
1303	379.6	286	F/A
1600	408.7	286	
1900	437.0	286	
2200	465.3	286	S/A
2203	465.5	286	F/A
29 11 1967 +03.		11	

0000	493.6	286	
0300	522.0	286	
0600	550.3	286	
0832	574.5	286	H/A
0846	575.9	106	A/CS
0924	581.3	500	H/T
1222	581.6	286	H/A
1230	582.5	286	F/A
1500	610.0	286	
1800	643.3	286	
2100	676.8	286	
30 11 1967 +03.		13	
0000	710.0	286	
0300	743.7	286	
0600	777.2	286	
0900	810.5	286	
1200	844.1	286	
1327	860.2	286	S/A
1330	860.4	286	F/A
1523	881.4	286	H/A
1540	883.0	500	H/T
1817	013.0	286	H/A
1833	014.8	286	F/A
2045	038.9	286	H/A
2237	050.7	286	F/A
01 12 1967 +03.		17	
0000	066.2	286	
0300	099.4	286	
0615	135.3	286	H/A
0735	143.6	286	F/A
0848	157.3	286	H/A
1100	171.4	286	
1215	179.4	500	H/T
1531	181.7	286	H/A
1618	186.6	286	F/A
1701	194.6	286	S/A
1704	194.9	286	F/A
1947	224.8	286	H/A
2130	235.7	302	A/CS
2133	236.2	302	H/A
2200	239.1	302	F/A
2300	250.0	302	H/A
2319	251.9	302	F/A
02 12 1967 +03.		14	
0045	267.7	302	H/A
0230	278.5	302	F/A
0330	289.3	270	A/C
0552	315.4	270	H/A
0855	334.7	270	F/A
1227	373.4	270	H/A
1605	396.1	335	A/C
1746	406.0	335	F/A
1800	408.5	350	A/CS

1804	408.8	350	F/A
1930	423.5	350	S/A
1934	423.8	350	F/A
2203	450.0	350	H/A
2350	460.0	350	F/A
03 12 1967 +03. 15			
0030	467.0	350	H/A
0117	471.3	350	F/A
0400	499.6	350	
0700	529.8	350	H/A
0844	539.5	350	F/A
1000	552.4	350	
1230	578.5	350	H/A
1402	586.8	324	A/CS
1600	607.6	324	H/A
1617	609.1	500	H/T
1926	609.3	324	H/A
1947	611.2	324	F/A
2200	635.3	324	S/A
2204	635.7	324	F/A
2300	646.0	237	A/C
04 12 1967 +03. 15			
0010	659.1	237	H/A
0153	670.0	237	F/A
0513	707.6	237	H/A
0656	719.1	237	F/A
0830	736.6	250	A/C
0900	742.1	260	A/C
1014	756.0	260	H/A
1200	766.8	260	F/A
1254	777.0	260	H/A
1347	782.6	260	F/A
1500	796.1	000	A/CS
1644	805.1	000	F/A
1900	828.0	000	
2200	857.2	000	
2358	876.3	000	S/A
05 12 1967 +03. 13			
0000	876.4	000	F/A
0300	905.8	000	
0600	935.8	000	
0938	972.9	000	S/A
0944	973.3	000	H/A
1004	975.3	000	F/A
1300	1005.8	000	
1700	1047.6	280	A/C
1728	1052.4	280	S/A
1730	1052.6	280	F/A
2129	1094.9	280	S/A
2130	1095.0	280	F/A
2341	1118.4	280	H/A
06 12 1967 +04. 14			
0028	1129.4	280	F/A

0300	1157.4	280	
0600	1190.4	280	
0900	1223.8	280	
1100	1246.1	280	H/A
1134	1249.8	280	F/A
1440	1283.2	280	H/A
1459	1285.0	500	H/T
1717	015.0	285	H/A
1728	016.1	285	F/A
1823	026.3	295	A/C
1959	043.4	285	A/CS
2001	043.6	285	F/A
2300	076.7	285	
07 12 1967 +04. 21			
0100	098.8	285	
0323	125.2	296	A/C
0530	148.6	305	A/C
0547	151.5	310	A/C
0600	154.1	305	A/C
0616	157.0	305	H/A
0632	158.9	305	F/A
0730	169.6	300	A/C
0737	170.6	335	A/C
0754	173.8	500	H/T
0802	174.0	335	S/A
0813	174.9	500	H/T
1144	177.6	355	F/A
1230	185.9	355	S/A
1235	186.1	500	H/T
1311	186.1	355	H/A
1337	188.6	013	A/CS
1600	213.1	013	
1900	244.9	013	
2130	271.0	013	S/A
2131	271.1	013	F/A
08 12 1967 +04. 14			
0000	297.3	013	
0300	328.2	013	
0600	359.5	013	
0930	394.9	060	A/C
0937	396.0	060	S/A
1000	398.1	500	H/T
1535	398.4	306	H/A
1600	400.5	306	F/A
1630	405.8	306	S/A
1632	406.0	306	F/A
2049	450.8	306	S/A
2130	454.7	306	F/A
2230	465.0	306	S/A
2232	465.2	306	F/A
09 12 1967 +04. 12			
0000	480.5	306	

0300	512.1	306	
0600	543.9	306	
0838	571.9	306	H/A
0900	574.1	306	F/A
1200	606.0	306	
1529	643.4	306	S/A
1531	643.6	306	F/A
1800	670.0	306	
2100	701.8	306	
2300	723.2	306	S/A
2303	723.4	306	F/A
10 12 1967 +04.		10	
0300	766.4	306	
0553	797.5	306	H/A
0640	802.1	500	H/T
1308	012.5	303	H/A
1322	013.9	303	F/A
1700	053.5	303	S/A
1703	053.7	303	F/A
2000	086.2	303	
2229	113.4	303	S/A
2231	113.6	303	F/A
11 12 1967 +04.		14	
0000	130.0	303	
0300	163.5	303	
0600	197.0	303	
0814	221.7	307	A/C
1100	252.6	307	
1400	286.2	307	
1727	324.5	307	S/A
1730	324.8	307	F/A
1800	330.2	307	H/A
1818	332.2	500	H/T
2116	332.2	307	H/A
2130	333.8	307	F/A
2159	339.0	307	S/A
2201	339.2	307	F/A
12 12 1967 +04.		11	
0000	361.1	307	
0300	394.9	307	
0600	428.5	307	
0900	462.1	307	
1200	495.9	307	
1500	529.8	307	H/A
1512	530.8	500	H/T
1747	530.8	307	H/A
1759	532.1	307	F/A
2100	565.6	307	
2253	586.7	270	A/C
13 12 1967 +05.		14	
0000	610.2	270	
0300	643.9	270	
0518	669.9	270	H/A

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0830   691.1    090      A/C
0905   694.5    500      H/T
1203   694.6    090      H/A
1310   700.1    245      A/C
1428   709.0    500      H/T
1618   709.0    290      H/A
1626   709.8    290      F/A
1700   715.8    290      S/A
1701   715.9    290      F/A
2130   765.8    290      S/A
2132   766.0    290      F/A
14 12 1967 +05.  10
0000   793.8    290
0300   827.8    290
0520   854.2    280      A/C
0800   884.3    280
1046   915.6    288      A/C
1444   960.3    282      A/C
1700   986.0    282
2019  1023.3    294      A/C
2030  1025.4    282      A/C
2133  1037.3    260      A/C
15 12 1967 +05.  07
0000  1064.8    260
0223  1091.6    183      A/C
0400  1109.7    190     A/CS
0425  1112.1    190      F/A
0500  1118.7    210      A/C
0507  1120.0    183      A/C
0657  1140.3    215      A/C
17 11 1967  2.0 1030 -23  0.91 -43  6.88  V24-3000 0.06-0.18 0.05 0.05 160.  8.5
17 11 1967  2.0 1514 -23  8.39 -42 34.18  V24-3003 0.03 0.25-0.14-0.01  90.  5.0
17 11 1967  2.0 2032 -23  9.35 -41 50.65  V24-3004 0.10-0.17 0.08 0.02  90.  9.2
18 11 1967  2.0  424 -23 16.32 -40 43.56  V24-3005 0.09-0.23 0.15 0.00  90.  7.0
18 11 1967  2.0  750 -23 17.85 -40 15.79  V24-3007-0.01 0.23-0.11 0.01  90.  7.0
18 11 1967  2.0 1426 -23 23.80 -39 19.55  V24-3008 0.01 0.22-0.09-0.00  90.  7.0
18 11 1967  2.0 1724 -23 22.83 -38 54.57  V24-3009-0.06 0.21-0.04-0.04  70.  7.0
18 11 1967  2.0 1912 -23 19.42 -38 40.12  V24-3010-0.05-0.23 0.09 0.02  70.  7.0
18 11 1967  2.0 2358 -23  8.71 -38  2.08  V24-3011-0.07 0.20-0.07-0.04  70.  7.0
19 11 1967  2.0  144 -23  4.96 -37 48.60  V24-3012-0.11-0.17 0.06-0.04  70.  7.0
19 11 1967  2.0  510 -22 58.21 -37 23.87  V24-3013-0.04-0.20 0.04-0.07  70.  7.0
19 11 1967  2.0  658 -22 55.23 -37 10.89  V24-3014 0.00 0.20-0.08-0.02  70.  7.0
19 11 1967  2.0  842 -22 55.00 -36 57.84  V24-3015-0.09 0.23-0.02-0.07  90.  7.0
19 11 1967  2.0 1154 -22 58.60 -36 44.01  V24-3016 0.12-0.15 0.08 0.03  90.  0.0
19 11 1967  2.0 1336 -23  0.32 -36 43.64  V24-3017-0.00 0.20-0.05-0.02   0.  0.0
19 11 1967  2.0 1818 -22 53.42 -36  8.45  V24-3018-0.03-0.22 0.03 0.01  70.  7.5
19 11 1967  2.0 2224 -22 45.31 -35 32.84  V24-3020 0.11 0.19-0.11 0.05  70.  8.0
19 11 1967  2.0 2312 -22 43.83 -35 26.13  V24-3021 0.00 0.24-0.11 0.00  70.  8.0
20 11 1967  2.0   58 -22 38.94 -35 11.89  V24-3022-0.07-0.40 0.01 0.00  70.  7.5
20 11 1967  2.0  418 -22 31.05 -34 44.41  V24-3023 0.02-0.23 0.10-0.04  70.  8.5
20 11 1967  2.0  606 -22 26.84 -34 30.00  V24-3024 0.06 0.13-0.03 0.03  70.  8.5
20 11 1967  2.0  940 -22 18.91 -34  1.80  V24-3025-0.08-0.17 0.07-0.01  70.  8.0
20 11 1967  2.0 1102 -22 20.63 -33 53.86  V24-3026 0.02-0.24 0.12-0.04 180.  9.5
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20	11	1967	2.0	1250	-22	30.18	-33	50.16	V24-3027	0.04	0.46	-0.01	0.04	65.	8.0
20	11	1967	2.0	2134	-22	15.45	-33	31.75	V24-3028	0.12	0.12	-0.05	0.08	35.	8.0
21	11	1967	2.0	156	-21	47.80	-33	7.85	V24-3029	-0.08	-0.23	0.11	-0.00	35.	8.0
21	11	1967	2.0	512	-21	26.23	-32	49.34	V24-3030	0.09	-0.20	0.02	0.01	35.	8.5
21	11	1967	2.0	704	-21	14.54	-32	38.21	V24-3031	-0.00	0.24	-0.12	0.00	35.	8.5
21	11	1967	2.0	852	-21	3.10	-32	28.77	V24-3032	-0.00	-0.35	0.01	0.03	35.	8.5
21	11	1967	2.0	1156	-20	43.18	-32	11.70	V24-3033	-0.09	-0.13	0.03	-0.08	35.	8.5
21	11	1967	2.0	1632	-20	12.32	-31	46.75	V24-3034	0.06	0.18	-0.06	0.02	35.	9.0
21	11	1967	2.0	1814	-20	0.87	-31	37.64	V24-3035	-0.10	-0.20	0.07	-0.01	35.	9.0
21	11	1967	2.0	1852	-19	56.39	-31	34.01	V24-3036	0.03	-0.25	0.13	-0.02	35.	9.0
21	11	1967	2.0	2324	-19	26.04	-31	9.10	V24-3037	-0.00	0.20	-0.07	0.00	35.	9.0
22	11	1967	2.0	112	-19	14.50	-30	59.61	V24-3038	0.02	-0.19	0.05	0.03	35.	9.0
22	11	1967	2.0	414	-18	54.24	-30	43.25	V24-3039	0.01	-0.21	0.07	-0.03	35.	9.0
22	11	1967	2.0	602	-18	42.12	-30	33.09	V24-3040	0.06	0.18	-0.05	0.02	35.	9.0
22	11	1967	2.0	802	-18	28.70	-30	22.33	V24-3041	0.03	0.23	-0.02	0.00	35.	9.0
22	11	1967	2.0	1112	-18	5.00	-30	9.83	V24-3042	0.06	-0.20	0.08	-0.00	25.	9.0
22	11	1967	2.0	1258	-17	52.04	-30	2.60	V24-3043	0.02	0.21	-0.05	0.00	25.	9.0
22	11	1967	2.0	1724	-17	31.20	-29	53.36	V24-3045	0.03	-0.39	0.01	0.05	90.	0.0
22	11	1967	2.0	2236	-17	1.36	-30	1.77	V24-3046	-0.02	0.25	-0.13	0.00	345.	9.0
23	11	1967	2.0	24	-16	45.45	-30	4.70	V24-3047	-0.01	-0.48	0.01	0.04	345.	9.0
23	11	1967	2.0	710	-15	45.43	-30	14.93	V24-3049	-0.03	0.21	-0.09	-0.01	345.	9.0
23	11	1967	2.0	1628	-14	32.34	-30	41.37	V24-3051	-0.02	0.22	-0.05	-0.02	340.	9.0
23	11	1967	2.0	1858	-14	12.34	-30	47.66	V24-3053	0.12	-0.19	0.12	0.04	340.	9.0
23	11	1967	2.0	2042	-13	57.74	-30	50.97	V24-3054	0.04	0.26	-0.02	0.03	340.	9.0
23	11	1967	2.0	2334	-13	34.32	-30	59.22	V24-3055	-0.06	0.17	-0.04	-0.04	340.	9.0
24	11	1967	2.0	124	-13	19.28	-31	5.28	V24-3056	0.03	-0.21	0.08	0.03	340.	9.0
24	11	1967	2.0	410	-12	56.96	-31	13.30	V24-3057	0.02	-0.21	0.07	-0.02	340.	9.0
24	11	1967	2.0	558	-12	41.50	-31	18.13	V24-3058	0.05	0.21	-0.05	0.03	340.	9.0
24	11	1967	2.0	810	-12	23.53	-31	24.12	V24-3059	0.09	0.24	-0.01	0.02	340.	9.0
24	11	1967	2.0	1122	-12	0.46	-31	29.11	V24-3060	0.10	-0.16	0.07	0.02	90.	0.0
24	11	1967	2.0	1718	-11	34.75	-31	35.99	V24-3061	-0.13	-0.30	0.01	-0.04	350.	9.0
24	11	1967	2.0	2138	-10	57.33	-31	42.59	V24-3062	0.09	0.20	-0.10	0.04	350.	9.0
24	11	1967	2.0	2248	-10	46.63	-31	44.38	V24-3063	0.01	0.23	-0.11	-0.01	350.	9.0
25	11	1967	2.0	36	-10	31.73	-31	46.91	V24-3064	0.00	-0.24	0.02	0.02	350.	9.0
25	11	1967	2.0	504	-9	53.64	-31	51.78	V24-3065	0.11	-0.31	0.01	0.02	350.	9.0
25	11	1967	2.0	716	-9	35.38	-31	54.10	V24-3066	-0.03	0.19	-0.07	-0.02	350.	9.0
25	11	1967	2.0	906	-9	19.56	-31	56.44	V24-3067	0.06	-0.17	0.05	0.04	350.	9.0
25	11	1967	2.0	1816	-8	3.37	-32	11.28	V24-3069	0.04	-0.21	0.08	0.03	350.	9.0
25	11	1967	2.0	2044	-7	42.45	-32	14.86	V24-3070	0.00	0.24	-0.03	0.01	350.	9.0
25	11	1967	2.0	2350	-7	16.52	-32	19.04	V24-3071	0.07	0.21	-0.03	0.01	350.	9.0
26	11	1967	2.0	408	-6	40.14	-32	23.85	V24-3072	0.08	-0.18	0.08	0.02	350.	9.0
26	11	1967	2.0	554	-6	25.18	-32	25.61	V24-3073	0.07	0.16	-0.05	0.04	350.	9.0
26	11	1967	2.0	626	-6	20.47	-32	26.08	V24-3074	-0.03	0.26	-0.15	-0.02	350.	9.0
26	11	1967	2.0	1130	-5	37.22	-32	33.90	V24-3075	0.08	-0.17	0.05	0.02	350.	9.0
26	11	1967	2.0	1724	-5	7.74	-32	42.22	V24-3077	0.06	-0.23	0.01	0.06	0.	0.0
26	11	1967	2.0	2302	-4	25.05	-32	49.40	V24-3079	0.04	0.21	-0.09	0.01	355.	9.0
27	11	1967	2.0	50	-4	9.22	-32	52.52	V24-3080	0.07	-0.16	0.04	0.05	355.	9.0
27	11	1967	2.0	310	-3	49.85	-32	55.77	V24-3081	-0.00	-0.27	0.16	-0.03	355.	9.0
27	11	1967	2.0	500	-3	34.51	-33	0.11	V24-3082	0.10	-0.19	0.01	0.03	340.	9.0
27	11	1967	2.0	726	-3	14.08	-33	9.52	V24-3083	0.08	0.17	-0.06	0.02	340.	9.0
27	11	1967	2.0	912	-2	59.58	-33	17.00	V24-3084	0.05	-0.19	0.07	0.03	330.	9.0
27	11	1967	2.0	1228	-2	33.98	-33	33.88	V24-3085	0.05	0.32	-0.02	0.06	330.	9.0
27	11	1967	2.0	1630	-2	2.64	-33	54.12	V24-3086	0.08	0.16	-0.05	0.02	330.	9.0

27	11	1967	2.0	1816	-1	49.97	-34	2.72	V24-3087	0.06	-0.20	0.08	0.04	330.	9.0
28	11	1967	2.0	2	-1	4.47	-34	29.24	V24-3088	0.08	0.36	-0.01	0.00	330.	9.0
28	11	1967	2.0	146	0	-50.06	-34	36.33	V24-3089	-0.04	-0.25	0.13	-0.00	330.	9.0
28	11	1967	2.0	402	0	-31.44	-34	45.99	V24-3090	0.02	-0.21	0.09	-0.00	330.	9.0
28	11	1967	2.0	550	0	-16.28	-34	54.09	V24-3091	0.07	0.15	-0.04	0.05	330.	9.0
28	11	1967	2.0	634	0	-09.90	-34	57.13	V24-3092	-0.00	0.26	-0.14	-0.01	330.	9.0
28	11	1967	2.0	1138	0	3.55	-35	3.20	V24-3093	0.06	-0.19	0.04	0.01	0.	0.0
28	11	1967	2.0	1322	0	7.81	-35	13.16	V24-3094	-0.02	0.23	-0.09	-0.00	286.	9.0
28	11	1967	2.0	1954	0	27.43	-36	9.58	V24-3096	-0.00	-0.26	0.03	-0.03	286.	9.0
28	11	1967	3.0	2358	0	40.40	-36	55.42	V24-3098	-0.04	-0.22	0.05	-0.01	286.	9.0
29	11	1967	3.0	354	0	50.20	-37	31.57	V24-3099	0.06	-0.21	0.03	0.00	286.	9.0
29	11	1967	3.0	538	0	54.13	-37	47.33	V24-3100	-0.02	0.24	-0.10	-0.00	286.	9.0
29	11	1967	3.0	630	0	56.12	-37	55.35	V24-3101	0.02	0.18	-0.07	-0.01	286.	9.0
29	11	1967	3.0	820	1	0.53	-38	12.59	V24-3102	0.10	-0.14	0.06	0.06	286.	9.0
29	11	1967	3.0	948	1	0.67	-38	12.84	V24-3103	0.02	-0.25	0.12	-0.01	90.	0.0
29	11	1967	3.0	1138	1	1.51	-38	14.96	V24-3104	0.08	0.19	-0.01	0.07	0.	0.0
29	11	1967	3.0	1804	1	20.25	-39	18.30	V24-3106	0.02	-0.25	0.11	-0.00	286.	11.0
29	11	1967	3.0	1954	1	25.57	-39	38.27	V24-3107	0.09	0.15	-0.02	0.07	286.	11.0
30	11	1967	3.0	58	1	40.84	-40	34.10	V24-3108	0.00	-0.25	0.12	0.00	286.	11.0
30	11	1967	3.0	258	1	46.70	-40	55.67	V24-3109	-0.00	-0.24	0.11	-0.01	286.	11.0
30	11	1967	3.0	730	1	58.52	-41	45.07	V24-3111	0.10	0.18	-0.01	0.05	286.	10.5
30	11	1967	3.0	1050	2	7.69	-42	21.91	V24-3113	0.11	-0.13	0.06	0.05	286.	10.5
30	11	1967	3.0	1234	2	11.88	-42	41.64	V24-3114	0.02	0.24	-0.07	0.03	286.	10.5
30	11	1967	3.0	1622	2	20.84	-43	15.64	V24-3115	0.10	0.17	-0.02	0.04	90.	0.0
30	11	1967	3.0	1856	2	22.96	-43	24.70	V24-3116	-0.09	-0.15	0.05	-0.06	286.	11.0
30	11	1967	3.0	2224	2	30.99	-43	55.52	V24-3117	0.02	0.22	-0.09	-0.00	286.	6.0
1	12	1967	3.0	350	2	46.92	-44	53.27	V24-3119	0.03	-0.20	0.06	-0.00	286.	11.0
1	12	1967	3.0	636	2	53.49	-45	22.84	V24-3121	0.04	0.22	-0.09	-0.00	286.	6.0
1	12	1967	3.0	824	2	58.31	-45	38.36	V24-3122	0.07	-0.16	0.04	0.04	286.	11.0
1	12	1967	3.0	958	3	2.36	-45	50.73	V24-3123	0.01	-0.27	0.14	-0.00	286.	7.0
1	12	1967	3.0	1710	3	11.67	-46	25.64	V24-3124	-0.01	-0.24	0.03	0.00	286.	10.5
1	12	1967	3.0	2326	3	33.14	-47	27.63	V24-3125	0.10	0.11	-0.03	0.05	302.	11.0
2	12	1967	3.0	626	3	59.56	-48	38.67	V24-3127	-0.05	0.25	-0.13	-0.00	270.	6.0
2	12	1967	3.0	732	4	1.71	-48	47.71	V24-3127	0.03	0.22	-0.03	-0.00	270.	6.0
2	12	1967	3.0	1240	4	14.74	-49	45.25	V24-3129	-0.06	0.20	-0.06	-0.02	270.	6.0
2	12	1967	3.0	1616	4	21.86	-50	12.38	V24-3130	0.02	0.19	-0.05	-0.02	335.	6.0
2	12	1967	3.0	1900	4	45.87	-50	20.75	V24-3131	-0.09	-0.20	0.07	-0.06	350.	10.0
2	12	1967	3.0	2048	5	5.69	-50	25.29	V24-3132	-0.07	0.18	-0.06	-0.01	350.	10.0
3	12	1967	3.0	22	5	39.57	-50	32.61	V24-3133	0.00	-0.22	0.03	0.01	350.	10.0
3	12	1967	3.0	346	6	15.19	-50	39.27	V24-3134	-0.00	-0.21	0.08	-0.01	350.	10.0
3	12	1967	3.0	536	6	34.70	-50	42.77	V24-3135	0.10	0.12	-0.04	0.07	350.	10.0
3	12	1967	3.0	830	6	58.95	-50	46.43	V24-3137	0.06	-0.17	0.03	0.04	350.	5.5
3	12	1967	3.0	1006	7	14.79	-50	48.22	V24-3138	-0.00	-0.28	0.15	-0.01	350.	10.0
3	12	1967	3.0	1710	8	2.38	-51	5.38	V24-3140	0.03	-0.21	0.01	0.02	0.	0.0
3	12	1967	3.0	2142	8	12.99	-51	20.52	V24-3141	-0.07	0.25	-0.14	-0.01	324.	10.5
4	12	1967	3.0	120	8	5.60	-51	47.06	V24-3142	-0.03	-0.24	0.11	-0.01	237.	6.0
4	12	1967	3.0	438	7	42.88	-52	15.91	V24-3143	0.02	-0.26	0.02	-0.01	237.	11.0
4	12	1967	3.0	738	7	28.66	-52	39.30	V24-3145	0.05	0.21	-0.03	-0.00	237.	10.5
4	12	1967	3.0	922	7	21.98	-52	57.71	V24-3146	-0.04	-0.23	0.10	-0.02	260.	11.0
4	12	1967	3.0	1104	7	21.01	-53	14.11	V24-3146	-0.02	-0.22	0.07	-0.02	260.	6.0
4	12	1967	3.0	1250	7	20.36	-53	31.78	V24-3147	-0.08	0.18	-0.07	-0.01	260.	10.5
4	12	1967	3.0	1802	7	47.84	-53	56.56	V24-3149	0.02	-0.21	0.07	0.01	0.	10.0
4	12	1967	3.0	1908	8	0.33	-53	57.52	V24-3150	0.05	-0.21	0.07	0.00	0.	10.0

4	12	1967	3.0	2244	8	41.30	-53	59.14	V24-3152	-0.04	0.23	-0.09	-0.05	0.	10.0
5	12	1967	3.0	32	9	0.54	-53	58.29	V24-3153	0.00	-0.19	0.04	-0.00	0.	9.0
5	12	1967	3.0	528	9	54.84	-53	56.02	V24-3154	-0.00	0.20	-0.03	0.00	0.	9.5
5	12	1967	3.0	646	10	8.81	-53	54.92	V24-3155	-0.01	0.23	-0.10	-0.03	0.	10.0
5	12	1967	3.0	832	10	26.88	-53	54.25	V24-3156	-0.01	-0.22	0.03	-0.02	0.	9.8
5	12	1967	3.0	1522	11	32.63	-53	53.26	V24-3158	0.03	0.25	-0.13	-0.02	0.	10.0
5	12	1967	3.0	1710	11	48.70	-53	54.83	V24-3159	0.04	-0.33	0.01	0.05	280.	10.0
5	12	1967	3.0	2348	12	0.89	-54	59.30	V24-3161	0.09	0.22	-0.02	0.02	280.	5.5
6	12	1967	4.0	32	12	3.75	-55	8.35	V24-3162	-0.00	-0.24	0.12	-0.00	280.	11.0
6	12	1967	4.0	336	12	9.08	-55	39.03	V24-3163	0.08	-0.16	0.03	0.03	280.	11.0
6	12	1967	4.0	520	12	11.43	-55	55.94	V24-3164	0.01	0.23	-0.09	0.02	280.	11.0
6	12	1967	4.0	646	12	13.17	-56	10.18	V24-3165	0.09	0.15	-0.03	0.03	280.	10.5
6	12	1967	4.0	1016	12	18.26	-56	45.58	V24-3167	0.07	-0.18	0.06	0.02	280.	10.5
6	12	1967	4.0	1202	12	20.64	-57	1.23	V24-3168	0.05	0.19	-0.06	0.03	280.	10.0
6	12	1967	4.0	1516	12	23.84	-57	30.30	V24-3169	0.08	0.17	-0.07	0.01	90.	0.0
6	12	1967	4.0	1700	12	23.41	-57	30.89	V24-3170	0.01	-0.22	0.06	0.00	90.	0.0
6	12	1967	4.0	1808	12	24.93	-57	38.79	V24-3171	-0.09	-0.18	0.08	-0.04	285.	10.5
6	12	1967	4.0	2346	12	38.11	-58	32.67	V24-3173	0.06	-0.17	0.04	0.03	285.	10.5
7	12	1967	4.0	238	12	43.08	-58	59.36	V24-3174	-0.00	-0.24	0.12	-0.01	285.	10.5
7	12	1967	4.0	428	12	49.29	-59	14.78	V24-3175	0.06	0.24	-0.01	0.06	296.	10.5
7	12	1967	4.0	554	12	55.80	-59	25.52	V24-3176	0.05	0.23	-0.11	-0.00	310.	10.5
7	12	1967	4.0	1906	14	12.66	-59	28.82	V24-3180	0.05	-0.38	0.01	-0.01	13.	10.5
7	12	1967	4.0	2052	14	28.84	-59	24.60	V24-3181	-0.01	0.25	-0.12	0.02	13.	10.0
7	12	1967	4.0	2300	14	48.65	-59	20.71	V24-3182	0.11	0.19	-0.01	0.04	13.	10.0
8	12	1967	4.0	46	15	5.57	-59	17.13	V24-3183	0.08	-0.22	0.13	0.03	13.	10.0
8	12	1967	4.0	332	15	31.24	-59	10.85	V24-3184	0.06	-0.17	0.04	0.02	13.	10.0
8	12	1967	4.0	518	15	47.21	-59	6.14	V24-3185	0.05	0.19	-0.08	0.05	13.	10.0
8	12	1967	4.0	838	16	16.82	-58	59.54	V24-3186	0.07	-0.21	0.11	0.02	13.	10.0
8	12	1967	4.0	1024	16	24.77	-58	55.88	V24-3187	0.03	-0.20	0.05	0.01	90.	0.0
8	12	1967	4.0	1208	16	23.90	-58	56.07	V24-3188	-0.04	0.24	-0.08	-0.00	0.	0.0
8	12	1967	4.0	1514	16	22.60	-58	56.84	V24-3189	0.07	0.18	-0.07	0.00	0.	0.0
8	12	1967	4.0	1658	16	27.35	-59	7.66	V24-3190	-0.01	-0.21	0.06	-0.01	306.	10.0
8	12	1967	4.0	1816	16	33.69	-59	18.79	V24-3191	0.06	-0.19	0.07	0.03	306.	10.0
8	12	1967	4.0	2002	16	42.58	-59	33.78	V24-3192	0.05	0.19	-0.05	0.04	306.	10.0
8	12	1967	4.0	2210	16	52.34	-59	50.15	V24-3193	0.06	0.19	-0.07	-0.00	306.	10.0
8	12	1967	4.0	2358	17	1.65	-60	6.33	V24-3194	0.08	-0.16	0.06	0.03	306.	10.0
9	12	1967	4.0	234	17	15.74	-60	28.84	V24-3195	-0.02	-0.25	0.12	-0.01	306.	10.0
9	12	1967	4.0	426	17	26.14	-60	44.19	V24-3196	0.08	0.22	-0.01	0.10	306.	10.0
9	12	1967	4.0	600	17	34.80	-60	57.44	V24-3197	0.05	0.21	-0.10	-0.00	306.	10.0
9	12	1967	4.0	746	17	44.41	-61	12.33	V24-3198	0.02	-0.21	0.03	0.01	306.	10.0
9	12	1967	4.0	1118	18	2.96	-61	39.27	V24-3199	-0.11	0.28	-0.01	-0.02	306.	10.0
9	12	1967	4.0	1912	18	44.93	-62	53.92	V24-3201	0.09	-0.47	0.01	0.02	306.	10.0
10	12	1967	4.0	324	19	29.57	-64	10.06	V24-3202	-0.05	-0.20	0.06	-0.04	306.	10.0
10	12	1967	4.0	512	19	39.73	-64	26.21	V24-3203	-0.04	0.22	-0.06	0.01	306.	10.0
10	12	1967	4.0	654	19	45.53	-64	36.44	V24-3204	-0.00	0.23	-0.03	-0.03	0.	0.0
10	12	1967	4.0	842	19	45.49	-64	37.74	V24-3205	0.03	-0.22	0.09	-0.00	90.	0.0
10	12	1967	4.0	1034	19	45.17	-64	38.28	V24-3205	0.05	-0.19	0.05	0.02	0.	0.0
10	12	1967	4.0	1216	19	44.99	-64	38.76	V24-3206	-0.10	0.16	-0.08	-0.03	90.	0.0
10	12	1967	4.0	1510	19	55.16	-64	55.98	V24-3207	-0.03	0.21	-0.08	-0.04	303.	9.5
10	12	1967	4.0	1816	20	11.01	-65	23.29	V24-3208	-0.04	-0.25	0.08	-0.02	303.	9.0
10	12	1967	4.0	2004	20	21.06	-65	39.13	V24-3209	-0.03	0.21	-0.04	0.01	303.	9.5
10	12	1967	4.0	2222	20	34.01	-66	0.13	V24-3210	0.07	0.19	-0.08	0.00	303.	9.5
11	12	1967	4.0	8	20	43.78	-66	15.53	V24-3211	0.04	-0.19	0.05	0.01	303.	10.0

11	12	1967	4.0	232	20	56.47	-66	37.29	V24-3212	0.01	-0.27	0.15	0.02	303.	10.0
11	12	1967	4.0	422	21	6.27	-66	53.49	V24-3213	0.11	-0.22	0.01	0.06	303.	10.0
11	12	1967	4.0	604	21	15.12	-67	8.90	V24-3214	-0.00	0.24	-0.11	0.03	303.	10.0
11	12	1967	4.0	754	21	25.10	-67	25.73	V24-3215	0.08	-0.18	0.02	0.05	303.	10.0
11	12	1967	4.0	942	21	36.61	-67	42.80	V24-3216	-0.01	-0.26	0.13	-0.00	307.	10.0
11	12	1967	4.0	1316	21	59.48	-68	16.67	V24-3217	-0.02	0.26	-0.13	0.02	307.	10.0
11	12	1967	4.0	1604	22	16.97	-68	41.26	V24-3218	0.05	0.23	-0.03	-0.01	307.	10.0
11	12	1967	4.0	1912	22	30.83	-68	57.45	V24-3220	-0.02	-0.25	0.02	-0.01	0.	0.0
11	12	1967	4.0	2320	22	44.26	-69	12.60	V24-3221	0.07	0.26	-0.01	-0.01	307.	9.5
12	12	1967	4.0	322	23	8.99	-69	48.02	V24-3223	-0.01	-0.22	0.09	-0.00	307.	10.0
12	12	1967	4.0	510	23	19.30	-70	3.96	V24-3224	0.01	0.21	-0.03	0.03	307.	10.0
12	12	1967	4.0	704	23	28.89	-70	21.08	V24-3225	0.10	0.13	-0.05	0.03	307.	10.0
12	12	1967	4.0	1042	23	47.86	-70	54.20	V24-3226	0.05	-0.17	0.06	0.01	307.	10.0
12	12	1967	4.0	1230	23	58.80	-71	9.47	V24-3227	0.03	0.22	-0.05	0.05	307.	10.0
12	12	1967	4.0	1818	24	20.54	-71	34.11	V24-3229	-0.10	-0.22	0.11	-0.04	307.	9.5
12	12	1967	4.0	2010	24	32.75	-71	48.92	V24-3230	0.05	0.21	-0.02	0.05	307.	10.0
12	12	1967	4.0	2232	24	48.86	-72	7.13	V24-3231	0.04	0.21	-0.08	-0.02	307.	10.0
12	12	1967	5.0	2320	24	51.50	-72	25.98	V24-3232	0.05	-0.19	0.04	0.02	270.	10.0
13	12	1967	5.0	502	24	50.82	-73	30.00	V24-3234	0.04	0.20	-0.08	0.05	270.	10.0
13	12	1967	5.0	700	24	49.96	-73	43.37	V24-3235	0.06	-0.43	0.00	0.07	270.	6.0
13	12	1967	5.0	846	24	49.66	-73	52.31	V24-3236	0.07	-0.24	0.15	0.01	90.	5.5
13	12	1967	5.0	1226	24	52.03	-73	46.89	V24-3237	-0.00	0.25	-0.12	0.03	90.	5.0
13	12	1967	5.0	1504	24	49.72	-73	47.97	V24-3238	0.10	0.14	-0.05	0.01	0.	0.0
13	12	1967	5.0	1648	24	51.30	-73	51.54	V24-3239	0.01	-0.21	0.07	-0.01	290.	10.0
13	12	1967	5.0	2004	25	2.95	-74	24.75	V24-3240	0.00	0.24	-0.09	0.04	290.	10.0
14	12	1967	5.0	16	25	17.46	-75	9.31	V24-3242	-0.02	-0.24	0.11	-0.04	290.	10.0
14	12	1967	5.0	222	25	23.33	-75	32.24	V24-3243	0.09	-0.19	0.11	0.05	290.	10.0
14	12	1967	5.0	408	25	28.89	-75	50.31	V24-3244	0.05	0.18	-0.01	0.05	290.	10.0
14	12	1967	5.0	550	25	33.30	-76	9.13	V24-3245	-0.05	0.25	-0.15	0.01	280.	10.0
14	12	1967	5.0	754	25	37.09	-76	32.87	V24-3246	0.05	-0.19	0.06	0.00	280.	10.0
14	12	1967	5.0	952	25	40.51	-76	55.73	V24-3247	0.03	-0.20	0.07	0.02	280.	10.0
14	12	1967	5.0	1140	25	44.48	-77	16.24	V24-3248	0.05	0.18	-0.04	0.05	288.	10.0
14	12	1967	5.0	1408	25	52.20	-77	44.11	V24-3249	0.03	0.25	-0.14	-0.05	288.	10.0
14	12	1967	5.0	1724	25	58.38	-78	19.92	V24-3251	-0.06	-0.23	0.12	-0.00	282.	10.0
14	12	1967	5.0	1914	26	1.92	-78	40.67	V24-3252	0.03	0.44	-0.01	0.05	282.	10.0
14	12	1967	5.0	2332	26	5.21	-79	28.42	V24-3253	0.08	-0.16	0.03	0.04	260.	10.0
15	12	1967	5.0	314	26	5.56	-80	0.04	V24-3254	0.08	-0.15	0.06	0.04	183.	8.0
15	12	1967	5.0	500	25	58.68	-80	4.26	V24-3255	0.07	0.16	-0.05	0.06	210.	10.0
15	12	1967	5.0	548	25	53.72	-80	2.97	V24-3256	0.05	-0.22	0.10	0.04	183.	10.0

OUTPUT

17	11	1967	2.0	1030	-23	0.9	-43	6.9	0.0	7.2	174	1.8	250	7.0	160	3000		5.2	1
17	11	1967	2.0	1031	-23	1.0	-43	6.9	0.1	7.6	119	1.8	250	8.9	110	0	A/C	46.4	2
17	11	1967	2.0	12 0	-23	6.4	-42	56.0	11.5	7.6	95	1.8	250	9.2	90	0	A/C	52.4	3
17	11	1967	2.0	1230	-23	6.7	-42	51.9	15.3	3.1	101	1.8	250	4.7	90	0	H/A	21.1	4
17	11	1967	2.0	1248	-23	6.9	-42	50.9	16.2	7.6	95	1.8	250	9.2	90	0	F/A	52.2	5
17	11	1967	2.0	1428	-23	7.9	-42	37.3	28.8	3.8	99	1.8	250	5.4	90	0	H/A	26.1	6
17	11	1967	2.0	1514	-23	8.4	-42	34.2	31.7	4.2	93	1.3	262	5.4	90	3003		28.9	7
17	11	1967	2.0	1556	-23	8.5	-42	31.0	34.6	8.0	91	1.3	262	9.2	90	0	F/A	55.4	8
17	11	1967	2.0	19 0	-23	9.1	-42	4.4	59.1	8.2	91	1.3	262	9.5	90	0		57.0	9
17	11	1967	2.0	2032	-23	9.3	-41	50.6	71.7	9.0	96	1.0	211	9.5	90	3004		61.9	10
17	11	1967	2.0	22 0	-23	10.6	-41	36.4	84.9	9.0	96	1.0	211	9.4	90	0		61.8	11
18	11	1967	2.0	0 0	-23	12.4	-41	17.0	102.8	9.0	96	1.0	211	9.5	90	0		62.2	12
18	11	1967	2.0	230	-23	14.6	-40	52.5	125.4	3.8	104	1.0	211	4.2	90	0	H/A	25.5	13
18	11	1967	2.0	4 0	-23	16.0	-40	46.6	131.1	6.9	97	1.0	211	7.4	90	0	F/A	47.7	14
18	11	1967	2.0	424	-23	16.3	-40	43.6	133.8	7.3	93	0.5	193	7.4	90	3005		50.6	15
18	11	1967	2.0	7 0	-23	17.5	-40	22.9	152.8	7.9	93	0.5	193	7.9	90	0		54.4	16
18	11	1967	2.0	750	-23	17.8	-40	15.8	159.4	8.0	97	0.9	182	7.9	90	3007		54.7	17
18	11	1967	2.0	1051	-23	20.6	-39	49.8	183.4	4.2	102	0.9	182	4.2	90	0	H/A	28.7	18
18	11	1967	2.0	11 4	-23	20.8	-39	48.8	184.3	8.0	96	0.9	182	8.0	90	0	F/A	55.2	19
18	11	1967	2.0	14 0	-23	23.4	-39	23.4	207.8	8.2	96	0.9	182	8.1	90	0		56.2	20
18	11	1967	2.0	1426	-23	23.8	-39	19.5	211.4	8.2	96	0.9	178	8.1	90	3008		56.6	21
18	11	1967	2.0	16 0	-23	25.2	-39	5.6	224.2	7.4	77	0.9	178	7.7	70	0	A/C	50.1	22
18	11	1967	2.0	1724	-23	22.8	-38	54.6	234.6	7.6	76	0.7	168	7.7	70	3009		51.1	23
18	11	1967	2.0	19 0	-23	19.8	-38	41.7	246.8	7.7	76	0.7	168	7.7	70	0		51.4	24
18	11	1967	2.0	1912	-23	19.4	-38	40.1	248.3	7.6	73	0.4	180	7.7	70	3010		50.3	25
18	11	1967	2.0	2130	-23	14.3	-38	22.0	265.8	7.7	73	0.4	180	7.9	70	0		51.3	26
18	11	1967	2.0	2358	-23	8.7	-38	2.1	284.9	7.6	73	0.5	192	7.9	70	3011		50.7	27
19	11	1967	2.0	0 0	-23	8.6	-38	1.8	285.2	7.3	73	0.5	192	7.6	70	0		48.6	28
19	11	1967	2.0	144	-23	5.0	-37	48.6	297.9	7.2	73	0.6	201	7.6	70	3012		47.8	29
19	11	1967	2.0	3 0	-23	2.3	-37	39.1	307.0	6.7	74	0.6	201	7.1	70	0		45.0	30
19	11	1967	2.0	510	-22	58.2	-37	23.9	321.6	6.8	76	0.8	182	7.1	70	3013		46.1	31
19	11	1967	2.0	6 0	-22	56.8	-37	17.9	327.3	6.8	76	0.8	182	7.1	70	0		46.1	32

19	11	1967	2.0	658	-22	55.2	-37	10.9	333.9	6.5	80	1.3	192	7.1	70	3014		44.4	33
19	11	1967	2.0	8 0	-22	54.1	-37	3.7	340.6	7.8	100	1.3	192	8.0	90	0	A/C	53.7	34
19	11	1967	2.0	842	-22	55.0	-36	57.8	346.1	7.7	98	1.2	199	8.0	90	3015		53.0	35
19	11	1967	2.0	1014	-22	56.7	-36	45.1	357.9	3.9	107	1.2	199	4.1	90	0	H/A	25.8	36
19	11	1967	2.0	1039	-22	57.2	-36	43.5	359.5	1.2	199	1.2	199	0.0	500	0	H/T	-2.7	37
19	11	1967	2.0	1154	-22	58.6	-36	44.0	361.0	1.0	169	1.0	169	0.0	500	3016		1.4	38
19	11	1967	2.0	1336	-23	0.3	-36	43.6	362.8	1.0	179	1.0	179	0.0	500	3017		0.1	39
19	11	1967	2.0	1345	-23	0.5	-36	43.6	362.9	3.4	86	1.0	179	3.7	70	0	H/A	24.0	40
19	11	1967	2.0	14 8	-23	0.4	-36	42.2	364.3	7.7	77	1.0	179	7.9	70	0	F/A	51.8	41
19	11	1967	2.0	18 0	-22	53.9	-36	10.8	393.9	2.8	90	1.0	179	3.0	70	0	S/A	19.8	42
19	11	1967	2.0	18 2	-22	53.9	-36	10.7	394.0	8.1	77	1.0	179	8.4	70	0	F/A	54.9	43
19	11	1967	2.0	1818	-22	53.4	-36	8.4	396.1	8.3	76	0.9	170	8.4	70	3018		55.8	44
19	11	1967	2.0	22 0	-22	46.1	-35	36.2	426.7	7.9	76	0.9	170	8.0	70	0		53.6	45
19	11	1967	2.0	2224	-22	45.3	-35	32.8	429.9	8.0	77	0.9	169	8.0	70	3020		53.9	46
19	11	1967	2.0	2312	-22	43.8	-35	26.1	436.3	7.9	70	0.2	266	8.0	70	3021		51.3	47
20	11	1967	2.0	0 0	-22	41.6	-35	19.7	442.6	8.0	70	0.2	266	8.2	70	0		52.3	48
20	11	1967	2.0	058	-22	38.9	-35	11.9	450.3	7.9	73	0.5	195	8.2	70	3022		52.9	49
20	11	1967	2.0	3 0	-22	34.1	-34	55.2	466.5	8.0	73	0.5	195	8.3	70	0		53.3	50
20	11	1967	2.0	418	-22	31.0	-34	44.4	476.9	7.8	72	0.6	218	8.3	70	3023		51.3	51
20	11	1967	2.0	6 0	-22	27.1	-34	30.8	490.0	7.9	72	0.6	218	8.4	70	0		52.2	52
20	11	1967	2.0	6 6	-22	26.8	-34	30.0	490.8	7.6	73	0.9	222	8.4	70	3024		50.8	53
20	11	1967	2.0	9 0	-22	20.4	-34	7.1	513.0	7.7	73	0.9	222	8.5	70	0		51.4	54
20	11	1967	2.0	940	-22	18.9	-34	1.8	518.1	8.2	71	0.3	213	8.5	70	3025		54.4	55
20	11	1967	2.0	1037	-22	16.4	-33	53.8	525.9	10.2	181	0.3	213	9.9	180	0	A/C	-1.1	56
20	11	1967	2.0	11 2	-22	20.6	-33	53.9	530.2	9.6	180	0.4	6	9.9	180	3026		0.0	57
20	11	1967	2.0	1213	-22	32.0	-33	53.8	541.5	4.3	61	0.4	6	4.1	65	0	A/CS	26.2	58
20	11	1967	2.0	1235	-22	31.2	-33	52.3	543.1	9.0	63	0.4	6	8.8	65	0	F/A	55.5	59
20	11	1967	2.0	1250	-22	30.2	-33	50.2	545.3	8.5	69	0.6	183	8.8	65	3027		55.1	60
20	11	1967	2.0	1325	-22	28.4	-33	45.2	550.3	0.6	183	0.6	183	0.0	500	0	H/T	-0.2	61
20	11	1967	2.0	1853	-22	31.8	-33	45.4	553.7	4.1	40	0.6	183	4.6	35	0	H/A	18.5	62
20	11	1967	2.0	1915	-22	30.7	-33	44.3	555.2	8.3	37	0.6	183	8.8	35	0	F/A	34.6	63
20	11	1967	2.0	2134	-22	15.4	-33	31.7	574.4	8.1	39	0.9	177	8.8	35	3028		35.7	64
20	11	1967	2.0	22 0	-22	12.7	-33	29.4	577.9	8.1	39	0.9	177	8.8	35	0		35.5	65
21	11	1967	2.0	0 0	-22	0.1	-33	18.4	594.1	8.1	39	0.9	177	8.8	35	0		35.8	66
21	11	1967	2.0	156	-21	47.8	-33	7.8	609.8	8.4	39	0.6	160	8.8	35	3029		37.2	67
21	11	1967	2.0	3 0	-21	40.8	-33	1.8	618.8	8.4	39	0.6	160	8.8	35	0		37.2	68
21	11	1967	2.0	512	-21	26.2	-32	49.3	637.4	8.3	42	1.1	155	8.8	35	3030		39.0	69
21	11	1967	2.0	6 0	-21	21.3	-32	44.6	644.1	8.4	42	1.1	155	8.9	35	0		39.5	70
21	11	1967	2.0	7 4	-21	14.5	-32	38.2	653.0	8.0	38	1.0	193	8.9	35	3031		34.7	71
21	11	1967	2.0	852	-21	3.1	-32	28.8	667.5	8.2	39	0.9	180	8.9	35	3032		36.1	72
21	11	1967	2.0	10 0	-20	55.9	-32	22.6	676.7	8.4	39	0.9	180	9.2	35	0		37.3	73
21	11	1967	2.0	1156	-20	43.2	-32	11.7	693.0	8.4	37	0.8	192	9.2	35	3033		35.6	74
21	11	1967	2.0	1358	-20	29.6	-32	0.7	710.1	2.3	43	0.8	192	3.0	35	0	S/A	11.1	75
21	11	1967	2.0	14 0	-20	29.5	-32	0.6	710.2	8.5	37	0.8	192	9.3	35	0	F/A	36.1	76
21	11	1967	2.0	1632	-20	12.3	-31	46.7	731.7	8.4	37	0.9	198	9.3	35	3034		35.7	77
21	11	1967	2.0	18 0	-20	2.5	-31	38.9	744.0	8.5	37	0.9	198	9.3	35	0		36.0	78
21	11	1967	2.0	1814	-20	0.9	-31	37.6	746.0	8.9	37	0.5	174	9.3	35	3035		37.9	79
21	11	1967	2.0	1852	-19	56.4	-31	34.0	751.6	8.5	38	0.9	189	9.3	35	3036		37.0	80
21	11	1967	2.0	21 0	-19	42.1	-31	22.2	769.7	5.2	39	0.9	189	6.0	35	0	S/A	23.2	81
21	11	1967	2.0	21 3	-19	41.9	-31	22.1	770.0	8.5	38	0.9	189	9.3	35	0	F/A	37.2	82
21	11	1967	2.0	2324	-19	26.0	-31	9.1	790.0	8.1	38	1.3	198	9.3	35	3037		35.3	83
22	11	1967	2.0	0 0	-19	22.2	-31	6.0	794.8	8.1	38	1.3	198	9.4	35	0		35.6	84
22	11	1967	2.0	112	-19	14.5	-30	59.6	804.6	8.4	37	1.0	195	9.4	35	3038		36.1	85

22	11	1967	2.0	3	0	-19	2.4	-30	49.9	819.8	8.3	37	1.0	195	9.3	35	0		35.8	86
22	11	1967	2.0	4	14	-18	54.2	-30	43.2	830.1	8.6	38	0.9	179	9.3	35	3039		37.7	87
22	11	1967	2.0	6	0	-18	42.3	-30	33.3	845.3	8.6	38	0.9	179	9.3	35	0		37.6	88
22	11	1967	2.0	6	2	-18	42.1	-30	33.1	845.5	8.4	37	0.9	194	9.3	35	3040		36.2	89
22	11	1967	2.0	8	2	-18	28.7	-30	22.3	862.4	8.4	37	0.9	198	9.3	35	3041		36.2	90
22	11	1967	2.0	8	16	-18	27.1	-30	21.1	864.4	8.4	26	0.9	198	9.3	25	0	A/C	26.2	91
22	11	1967	2.0	11	0	-18	6.5	-30	10.6	887.3	8.4	26	0.9	198	9.3	25	0		26.4	92
22	11	1967	2.0	11	12	-18	5.0	-30	9.8	888.9	8.3	28	1.1	182	9.3	25	3042		27.9	93
22	11	1967	2.0	12	58	-17	52.0	-30	2.6	903.6	8.2	24	1.1	215	9.3	25	3043		24.0	94
22	11	1967	2.0	14	0	-17	44.3	-29	59.0	912.1	8.5	24	1.1	215	9.6	25	0		24.8	95
22	11	1967	2.0	15	45	-17	30.6	-29	52.7	927.0	2.9	21	1.1	215	4.0	25	0	S/A	7.6	96
22	11	1967	2.0	16	0	-17	29.9	-29	52.4	927.7	1.1	215	1.1	215	0.0	500	0	H/T	-4.7	97
22	11	1967	2.0	17	24	-17	31.2	-29	53.4	929.3	0.8	165	0.8	165	0.0	500	3045		1.5	98
22	11	1967	2.0	18	52	-17	32.3	-29	53.1	930.4	6.0	345	0.8	165	6.8	345	0	H/A	-11.1	99
22	11	1967	2.0	19	0	-17	31.6	-29	53.3	931.2	8.4	345	0.8	165	9.2	345	0	F/A	-15.7	100
22	11	1967	2.0	19	30	-17	27.5	-29	54.4	935.4	5.2	345	0.8	165	6.0	345	0	S/A	-9.7	101
22	11	1967	2.0	19	34	-17	27.2	-29	54.5	935.8	8.8	345	0.8	165	9.6	345	0	F/A	-16.5	102
22	11	1967	2.0	22	0	-17	6.4	-30	0.4	957.3	8.7	345	0.8	165	9.5	345	0		-16.3	103
22	11	1967	2.0	22	36	-17	1.4	-30	1.8	962.5	9.0	350	1.0	111	9.5	345	3046		-11.3	104
23	11	1967	2.0	0	0	-16	49.0	-30	4.0	975.1	9.0	350	1.0	111	9.5	345	0		-11.3	105
23	11	1967	2.0	0	24	-16	45.4	-30	4.7	978.7	9.0	351	1.0	104	9.5	345	3047		-10.2	106
23	11	1967	2.0	3	0	-16	22.3	-30	8.7	1002.2	8.9	351	1.0	104	9.4	345	0		-10.1	107
23	11	1967	2.0	6	0	-15	55.8	-30	13.2	1029.0	9.0	351	1.0	104	9.4	345	0		-10.2	108
23	11	1967	2.0	7	10	-15	45.4	-30	14.9	1039.5	8.2	346	1.2	158	9.4	345	3049		-14.5	109
23	11	1967	2.0	8	0	-15	38.8	-30	16.7	1046.3	8.2	340	1.2	158	9.4	340	0	A/C	-20.3	110
23	11	1967	2.0	9	0	-15	31.1	-30	19.5	1054.5	4.8	340	1.2	158	6.0	340	0	S/A	-11.9	111
23	11	1967	2.0	9	3	-15	30.8	-30	19.6	1054.8	8.3	340	1.2	158	9.6	340	0	F/A	-20.7	112
23	11	1967	2.0	12	0	-15	7.7	-30	28.2	1079.3	8.4	340	1.2	158	9.7	340	0		-21.1	113
23	11	1967	2.0	15	0	-14	43.9	-30	37.1	1104.7	8.3	340	1.2	158	9.6	340	0		-20.8	114
23	11	1967	2.0	16	28	-14	32.3	-30	41.4	1116.9	8.4	343	1.3	140	9.6	340	3051		-17.9	115
23	11	1967	2.0	18	0	-14	20.1	-30	45.2	1129.7	8.4	343	1.3	140	9.6	340	0		-17.9	116
23	11	1967	2.0	18	58	-14	12.3	-30	47.7	1137.8	8.8	347	1.4	106	9.6	340	3053		-14.6	117
23	11	1967	2.0	19	57	-14	3.9	-30	49.6	1146.5	3.4	360	1.4	106	4.0	340	0	S/A	-0.0	118
23	11	1967	2.0	20	0	-14	3.7	-30	49.6	1146.7	8.7	348	1.4	106	9.5	340	0	F/A	-13.3	119
23	11	1967	2.0	20	42	-13	57.7	-30	51.0	1152.8	8.7	341	0.8	148	9.5	340	3054		-20.7	120
23	11	1967	2.0	22	0	-13	47.1	-30	54.7	1164.0	8.6	341	0.8	148	9.4	340	0		-20.6	121
23	11	1967	2.0	23	34	-13	34.3	-30	59.2	1177.5	8.8	339	0.7	179	9.4	340	3055		-23.0	122
24	11	1967	2.0	0	0	-13	30.8	-31	0.6	1181.3	8.8	339	0.7	179	9.5	340	0		-23.2	123
24	11	1967	2.0	1	24	-13	19.3	-31	5.3	1193.7	8.5	341	1.0	154	9.5	340	3056		-20.3	124
24	11	1967	2.0	3	0	-13	6.4	-31	9.9	1207.3	8.6	341	1.0	154	9.6	340	0		-20.6	125
24	11	1967	2.0	4	10	-12	57.0	-31	13.3	1217.3	9.0	343	0.8	121	9.6	340	3057		-19.3	126
24	11	1967	2.0	5	58	-12	41.5	-31	18.1	1233.5	8.7	342	0.9	141	9.6	340	3058		-19.8	127
24	11	1967	2.0	6	0	-12	41.2	-31	18.2	1233.8	8.6	342	0.9	141	9.5	340	0		-19.5	128
24	11	1967	2.0	8	10	-12	23.5	-31	24.1	1252.4	8.6	340	0.8	158	9.5	340	3059		-21.8	129
24	11	1967	2.0	9	0	-12	16.8	-31	26.6	1259.6	8.7	351	0.8	158	9.5	350	0	A/C	-10.1	130
24	11	1967	2.0	10	37	-12	2.8	-31	28.8	1273.7	4.8	352	0.8	158	5.6	350	0	H/A	-4.9	131
24	11	1967	2.0	10	52	-12	1.7	-31	29.0	1274.9	0.8	158	0.8	158	0.0	500	0	H/T	2.4	132
24	11	1967	2.0	11	2	-12	1.8	-31	28.9	1275.0	4.8	352	0.8	158	5.6	350	0	H/A	-5.0	133
24	11	1967	2.0	11	19	-12	0.4	-31	29.1	1276.4	0.8	158	0.8	158	0.0	500	0	H/T	2.4	134
24	11	1967	2.0	11	22	-12	0.5	-31	29.1	1276.4	0.7	203	0.7	203	0.0	500	3060		-2.0	135
24	11	1967	2.0	14	3	-12	2.1	-31	29.8	1278.2	5.4	346	0.7	203	6.0	350	0	H/A	-9.7	136
24	11	1967	2.0	14	12	-12	1.3	-31	30.0	1279.1	8.7	348	0.7	203	9.3	350	0	F/A	-13.3	137
24	11	1967	2.0	15	0	-11	54.6	-31	31.6	1286.0	5.4	346	0.7	203	6.0	350	0	S/A	-9.7	138

24	11	1967	2.0	15 3	-11	54.3	-31	31.6	1286.3	8.9	348	0.7	203	9.5	350	0	F/A	-13.7	139
24	11	1967	2.0	1718	-11	34.7	-31	36.0	1306.3	8.8	350	0.7	168	9.5	350	3061		-11.3	140
24	11	1967	2.0	18 0	-11	28.7	-31	37.1	1312.4	8.8	350	0.7	168	9.5	350	0		-11.3	141
24	11	1967	2.0	2030	-11	7.0	-31	40.9	1334.4	5.3	350	0.7	168	6.0	350	0	S/A	-6.8	142
24	11	1967	2.0	2031	-11	6.9	-31	40.9	1334.5	8.7	350	0.7	168	9.4	350	0	F/A	-11.2	143
24	11	1967	2.0	2138	-10	57.3	-31	42.6	1344.3	9.3	351	0.2	128	9.4	350	3062		-10.8	144
24	11	1967	2.0	2248	-10	46.6	-31	44.4	1355.1	8.4	351	1.0	166	9.4	350	3063		-9.7	145
25	11	1967	2.0	0 0	-10	36.7	-31	46.1	1365.2	8.4	351	1.0	166	9.4	350	0		-9.8	146
25	11	1967	2.0	036	-10	31.7	-31	46.9	1370.2	8.6	353	1.0	144	9.4	350	3064		-7.8	147
25	11	1967	2.0	3 0	-10	11.3	-31	49.5	1390.8	8.6	353	1.0	144	9.5	350	0		-7.8	148
25	11	1967	2.0	5 4	-9	53.6	-31	51.8	1408.6	8.4	353	1.1	148	9.5	350	3065		-7.7	149
25	11	1967	2.0	6 0	-9	45.8	-31	52.8	1416.5	8.3	353	1.1	148	9.4	350	0		-7.6	150
25	11	1967	2.0	716	-9	35.4	-31	54.1	1427.0	8.7	352	0.7	148	9.4	350	3066		-9.1	151
25	11	1967	2.0	9 0	-9	20.4	-31	56.3	1442.1	8.7	352	0.7	148	9.4	350	0		-9.1	152
25	11	1967	2.0	9 6	-9	19.6	-31	56.4	1443.0	8.5	349	0.9	179	9.4	350	3067		-12.1	153
25	11	1967	2.0	12 0	-8	55.4	-32	1.2	1467.6	8.4	349	0.9	179	9.3	350	0		-12.0	154
25	11	1967	2.0	1630	-8	18.1	-32	8.4	1505.6	2.1	346	0.9	179	3.0	350	0	S/A	-3.9	155
25	11	1967	2.0	1632	-8	18.0	-32	8.4	1505.7	8.6	349	0.9	179	9.5	350	0	F/A	-12.3	156
25	11	1967	2.0	18 0	-8	5.6	-32	10.8	1518.3	8.6	349	0.9	179	9.5	350	0		-12.3	157
25	11	1967	2.0	1816	-8	3.4	-32	11.3	1520.6	8.6	350	0.9	166	9.5	350	3069		-11.2	158
25	11	1967	2.0	2044	-7	42.4	-32	14.9	1541.8	8.5	351	1.0	162	9.5	350	3070		-9.9	159
25	11	1967	2.0	21 0	-7	40.2	-32	15.2	1544.1	3.0	353	1.0	162	4.0	350	0	S/A	-2.7	160
25	11	1967	2.0	21 3	-7	40.1	-32	15.2	1544.2	8.6	351	1.0	162	9.6	350	0	F/A	-10.0	161
25	11	1967	2.0	2350	-7	16.5	-32	19.0	1568.1	8.6	353	1.1	150	9.6	350	3071		-7.8	162
26	11	1967	2.0	0 0	-7	15.1	-32	19.2	1569.5	8.5	353	1.1	150	9.6	350	0		-7.8	163
26	11	1967	2.0	3 0	-6	49.7	-32	22.6	1595.1	8.5	353	1.1	150	9.5	350	0		-7.8	164
26	11	1967	2.0	4 8	-6	40.1	-32	23.8	1604.7	8.5	353	1.1	144	9.5	350	3072		-7.8	165
26	11	1967	2.0	554	-6	25.2	-32	25.6	1619.8	8.8	354	1.0	128	9.5	350	3073		-6.9	166
26	11	1967	2.0	6 0	-6	24.3	-32	25.7	1620.7	8.9	354	1.0	128	9.6	350	0		-7.0	167
26	11	1967	2.0	626	-6	20.5	-32	26.1	1624.5	8.7	350	0.9	172	9.6	350	3074		-11.3	168
26	11	1967	2.0	9 0	-5	58.6	-32	30.0	1646.8	8.7	350	0.9	172	9.6	350	0		-11.3	169
26	11	1967	2.0	1130	-5	37.2	-32	33.9	1668.5	9.3	347	0.6	225	9.6	350	3075		-15.6	170
26	11	1967	2.0	12 0	-5	32.7	-32	35.0	1673.1	9.3	347	0.6	225	9.6	350	0		-15.7	171
26	11	1967	2.0	1445	-5	7.9	-32	40.8	1698.6	4.6	344	0.6	225	4.9	350	0	H/A	-9.6	172
26	11	1967	2.0	15 2	-5	6.7	-32	41.2	1699.9	0.6	225	0.6	225	0.0	500	0	H/T	-3.5	173
26	11	1967	2.0	1724	-5	7.7	-32	42.2	1701.4	0.9	216	0.9	216	0.0	500	3077		-4.2	174
26	11	1967	2.0	18 0	-5	8.2	-32	42.5	1701.9	5.3	348	0.9	216	6.0	355	0	H/A	-8.4	175
26	11	1967	2.0	18 8	-5	7.5	-32	42.7	1702.6	8.8	351	0.9	216	9.5	355	0	F/A	-10.4	176
26	11	1967	2.0	21 0	-4	42.6	-32	46.6	1727.8	8.7	351	0.9	216	9.4	355	0		-10.3	177
26	11	1967	2.0	23 2	-4	25.0	-32	49.4	1745.6	9.0	349	1.1	238	9.4	355	3079		-12.9	178
27	11	1967	2.0	0 0	-4	16.5	-32	51.1	1754.2	9.0	349	1.1	238	9.4	355	0		-12.9	179
27	11	1967	2.0	050	-4	9.2	-32	52.5	1761.7	8.4	350	1.2	208	9.4	355	3080		-11.0	180
27	11	1967	2.0	3 0	-3	51.2	-32	55.5	1779.9	8.4	350	1.2	208	9.4	355	0		-11.0	181
27	11	1967	2.0	310	-3	49.8	-32	55.8	1781.3	8.7	353	0.8	195	9.4	355	3081		-8.0	182
27	11	1967	2.0	4 0	-3	42.7	-32	56.6	1788.6	8.9	337	0.8	195	9.5	340	0	A/C	-26.2	183
27	11	1967	2.0	5 0	-3	34.5	-33	0.1	1797.4	9.2	335	0.8	225	9.5	340	3082		-29.3	184
27	11	1967	2.0	7 0	-3	17.8	-33	7.8	1815.9	9.4	335	0.8	225	9.7	340	0		-29.8	185
27	11	1967	2.0	726	-3	14.1	-33	9.5	1819.9	9.3	337	0.7	210	9.7	340	3083		-27.3	186
27	11	1967	2.0	830	-3	5.0	-33	13.4	1829.8	9.3	326	0.7	210	9.6	330	0	A/C	-39.1	187
27	11	1967	2.0	912	-2	59.6	-33	17.0	1836.3	9.4	327	0.6	216	9.6	330	3084		-38.4	188
27	11	1967	2.0	11 0	-2	45.5	-33	26.3	1853.2	9.4	327	0.6	216	9.6	330	0		-38.6	189
27	11	1967	2.0	1228	-2	34.0	-33	33.9	1867.0	9.2	327	0.6	198	9.6	330	3085		-37.9	190
27	11	1967	2.0	14 0	-2	22.1	-33	41.6	1881.1	9.3	327	0.6	198	9.7	330	0		-38.0	191

27	11	1967	2.0	1630	-2	2.6	-33	54.1	1904.3	8.8	326	1.1	185	9.7	330	3086		-37.1	192
27	11	1967	2.0	17 0	-1	59.0	-33	56.6	1908.7	8.6	326	1.1	185	9.5	330	0		-36.3	193
27	11	1967	2.0	1816	-1	50.0	-34	2.7	1919.6	9.0	330	0.4	155	9.5	330	3087		-34.1	194
27	11	1967	2.0	21 0	-1	28.6	-34	15.2	1944.3	2.6	329	0.4	155	3.0	330	0	S/A	-10.0	195
27	11	1967	2.0	21 2	-1	28.5	-34	15.2	1944.4	9.3	330	0.4	155	9.7	330	0	F/A	-35.0	196
28	11	1967	2.0	0 0	-1	4.7	-34	29.1	1971.9	9.4	330	0.4	155	9.8	330	0		-35.3	197
28	11	1967	2.0	0 2	-1	4.5	-34	29.2	1972.2	9.3	334	0.8	102	9.8	330	3088		-30.6	198
28	11	1967	2.0	146	0	-50.1	-34	36.3	1988.3	9.3	333	0.7	113	9.8	330	3089		-31.7	199
28	11	1967	2.0	3 0	0	-39.9	-34	41.6	1999.7	9.3	333	0.7	113	9.8	330	0		-31.7	200
28	11	1967	2.0	4 2	0	-31.4	-34	46.0	2009.3	9.5	332	0.4	99	9.8	330	3090		-33.8	201
28	11	1967	2.0	550	0	-16.3	-34	54.1	2026.4	9.7	334	0.8	67	9.8	330	3091		-32.2	202
28	11	1967	2.0	6 0	0	-14.8	-34	54.8	2028.1	9.6	335	0.8	67	9.7	330	0		-30.6	203
28	11	1967	2.0	634	0	-9.9	-34	57.1	2033.5	10.3	332	0.7	354	9.7	330	3092		-36.5	204
28	11	1967	2.0	730	0	-1.4	-35	1.7	2043.1	6.6	332	0.7	354	6.0	330	0	H/A	-23.6	205
28	11	1967	2.0	747	0	0.2	-35	2.6	2045.0	9.1	332	0.7	354	8.4	330	0	F/A	-32.1	206
28	11	1967	2.0	752	0	0.9	-35	2.9	2045.8	0.7	354	0.7	354	0.0	500	0	H/T	-0.5	207
28	11	1967	2.0	1138	0	3.5	-35	3.2	2048.4	0.8	27	0.8	27	0.0	500	3093		2.8	208
28	11	1967	2.0	12 6	0	3.9	-35	3.0	2048.8	6.4	293	0.8	27	6.5	286	0	H/A	-44.4	209
28	11	1967	2.0	1230	0	4.9	-35	5.4	2051.4	9.7	291	0.8	27	9.8	286	0	F/A	-68.1	210
28	11	1967	2.0	13 0	0	6.6	-35	9.9	2056.2	7.9	292	0.8	27	8.0	286	0	H/A	-55.1	211
28	11	1967	2.0	13 3	0	6.7	-35	10.3	2056.6	9.7	291	0.8	27	9.9	286	0	F/A	-68.5	212
28	11	1967	2.0	1322	0	7.8	-35	13.2	2059.7	9.4	289	0.7	59	9.9	286	3094		-67.0	213
28	11	1967	2.0	16 0	0	15.9	-35	36.6	2084.4	9.0	289	0.7	59	9.4	286	0		-63.9	214
28	11	1967	2.0	19 0	0	24.8	-36	2.0	2111.3	9.0	289	0.7	59	9.4	286	0		-63.9	215
28	11	1967	2.0	1954	0	27.4	-36	9.6	2119.4	9.4	286	0.0	153	9.4	286	3096		-68.1	216
28	11	1967	2.0	22 0	0	32.8	-36	28.6	2139.2	4.0	286	0.0	153	4.0	286	0	S/A	-28.9	217
28	11	1967	2.0	22 3	0	32.9	-36	28.8	2139.4	9.5	286	0.0	153	9.5	286	0	F/A	-68.8	218
28	11	1967	3.0	2358	0	40.4	-36	55.4	2167.0	9.6	285	0.2	220	9.5	286	3098		-69.8	219
29	11	1967	3.0	0 0	0	40.5	-36	55.7	2167.4	9.5	285	0.2	220	9.5	286	0		-69.4	220
29	11	1967	3.0	3 0	0	48.0	-37	23.3	2196.0	9.5	285	0.2	220	9.4	286	0		-69.1	221
29	11	1967	3.0	354	0	50.2	-37	31.6	2204.5	9.4	284	0.3	184	9.4	286	3099		-68.5	222
29	11	1967	3.0	538	0	54.1	-37	47.3	2220.7	9.5	284	0.3	200	9.4	286	3100		-69.2	223
29	11	1967	3.0	6 0	0	55.0	-37	50.7	2224.2	9.6	284	0.3	200	9.6	286	0		-70.1	224
29	11	1967	3.0	630	0	56.1	-37	55.3	2229.0	9.7	284	0.3	224	9.6	286	3101		-70.9	225
29	11	1967	3.0	820	1	0.5	-38	12.6	2246.8	11.2	286	1.6	288	9.6	286	3102		-80.8	226
29	11	1967	3.0	832	1	1.2	-38	14.7	2249.0	7.6	286	1.6	288	6.0	286	0	H/A	-55.2	227
29	11	1967	3.0	846	1	1.7	-38	16.4	2250.8	6.9	106	1.6	288	8.5	106	0	A/CS	50.1	228
29	11	1967	3.0	924	1	0.5	-38	12.2	2255.2	1.6	288	1.6	288	0.0	500	0	H/T	-11.8	229
29	11	1967	3.0	948	1	0.7	-38	12.8	2255.8	1.2	292	1.2	292	0.0	500	3103		-8.9	230
29	11	1967	3.0	1138	1	1.5	-38	15.0	2258.1	0.6	295	0.6	295	0.0	500	3104		-4.1	231
29	11	1967	3.0	1222	1	1.7	-38	15.3	2258.5	7.3	287	0.6	295	6.8	286	0	H/A	-52.8	232
29	11	1967	3.0	1230	1	2.0	-38	16.3	2259.5	11.6	286	0.6	295	11.0	286	0	F/A	-83.7	233
29	11	1967	3.0	15 0	1	10.1	-38	44.0	2288.4	11.7	286	0.6	295	11.1	286	0		-84.4	234
29	11	1967	3.0	18 0	1	20.0	-39	17.5	2323.4	11.7	286	0.6	295	11.2	286	0		-84.8	235
29	11	1967	3.0	18 4	1	20.2	-39	18.3	2324.1	11.3	285	0.2	222	11.2	286	3106		-82.0	236
29	11	1967	3.0	1954	1	25.6	-39	38.3	2344.8	11.5	285	0.3	261	11.2	286	3107		-83.4	237
29	11	1967	3.0	21 0	1	28.9	-39	50.4	2357.4	11.4	285	0.3	261	11.1	286	0		-82.6	238
30	11	1967	3.0	0 0	1	37.9	-40	23.3	2391.5	11.5	285	0.3	261	11.2	286	0		-83.8	239
30	11	1967	3.0	058	1	40.8	-40	34.1	2402.7	11.2	285	0.2	174	11.2	286	3108		-81.2	240
30	11	1967	3.0	258	1	46.7	-40	55.7	2425.0	11.3	283	0.5	201	11.2	286	3109		-82.8	241
30	11	1967	3.0	3 0	1	46.8	-40	56.0	2425.4	11.2	283	0.5	201	11.2	286	0		-82.3	242
30	11	1967	3.0	6 0	1	54.6	-41	28.8	2459.0	11.2	283	0.5	201	11.1	286	0		-81.8	243
30	11	1967	3.0	730	1	58.5	-41	45.1	2475.8	11.3	284	0.5	225	11.1	286	3111		-82.7	244

30	11	1967	3.0	9 0	2	2.6	-42	1.6	2492.8	11.4	284	0.5	225	11.2	286	0		-83.4	245
30	11	1967	3.0	1050	2	7.7	-42	21.9	2513.7	11.7	282	0.9	224	11.2	286	3113		-85.8	246
30	11	1967	3.0	12 0	2	10.5	-42	35.2	2527.3	11.6	282	0.9	224	11.1	286	0		-85.1	247
30	11	1967	3.0	1234	2	11.9	-42	41.6	2533.9	11.8	285	0.7	269	11.1	286	3114		-85.5	248
30	11	1967	3.0	1327	2	14.6	-42	51.7	2544.3	4.7	284	0.7	269	4.0	286	0	S/A	-34.3	249
30	11	1967	3.0	1330	2	14.6	-42	51.9	2544.5	11.8	285	0.7	269	11.1	286	0	F/A	-85.9	250
30	11	1967	3.0	1523	2	20.4	-43	13.4	2566.8	6.3	284	0.7	269	5.6	286	0	H/A	-46.2	251
30	11	1967	3.0	1540	2	20.8	-43	15.2	2568.5	0.7	269	0.7	269	0.0	500	0	H/T	-5.5	252
30	11	1967	3.0	1622	2	20.8	-43	15.6	2569.0	1.3	278	1.3	278	0.0	500	3115		-9.9	253
30	11	1967	3.0	1817	2	21.2	-43	18.1	2571.5	8.0	285	1.3	278	6.8	286	0	H/A	-58.5	254
30	11	1967	3.0	1833	2	21.7	-43	20.2	2573.6	12.2	285	1.3	278	11.0	286	0	F/A	-88.9	255
30	11	1967	3.0	1856	2	23.0	-43	24.7	2578.3	11.4	285	0.5	259	11.0	286	3116		-82.7	256
30	11	1967	3.0	2045	2	28.3	-43	44.7	2599.0	6.8	284	0.5	259	6.3	286	0	H/A	-49.4	257
30	11	1967	3.0	2224	2	31.0	-43	55.5	2610.2	6.4	285	0.2	240	6.3	286	3117		-46.8	258
30	11	1967	3.0	2237	2	31.4	-43	56.9	2611.6	11.3	285	0.2	240	11.2	286	0	F/A	-82.2	259
1	12	1967	3.0	0 0	2	35.5	-44	12.0	2627.2	11.2	285	0.2	240	11.1	286	0		-81.2	260
1	12	1967	3.0	3 0	2	44.4	-44	44.3	2660.7	11.2	285	0.2	240	11.0	286	0		-81.0	261
1	12	1967	3.0	350	2	46.9	-44	53.3	2670.0	11.5	283	0.8	232	11.0	286	3119		-84.6	262
1	12	1967	3.0	615	2	53.1	-45	20.5	2697.9	6.7	280	0.8	232	6.2	286	0	H/A	-50.0	263
1	12	1967	3.0	636	2	53.5	-45	22.8	2700.3	6.7	288	0.5	308	6.2	286	3121		-48.3	264
1	12	1967	3.0	735	2	55.5	-45	29.2	2706.9	11.8	287	0.5	308	11.3	286	0	F/A	-84.6	265
1	12	1967	3.0	824	2	58.3	-45	38.4	2716.5	11.9	287	0.7	312	11.3	286	3122		-85.6	266
1	12	1967	3.0	848	2	59.7	-45	42.9	2721.3	7.1	289	0.7	312	6.4	286	0	H/A	-50.3	267
1	12	1967	3.0	958	3	2.4	-45	50.7	2729.5	7.4	285	1.0	281	6.4	286	3123		-53.9	268
1	12	1967	3.0	11 0	3	4.4	-45	58.1	2737.1	7.4	285	1.0	281	6.4	286	0		-53.8	269
1	12	1967	3.0	1215	3	6.8	-46	7.0	2746.4	1.0	281	1.0	281	0.0	500	0	H/T	-7.7	270
1	12	1967	3.0	1531	3	7.4	-46	10.3	2749.6	7.2	285	1.0	281	6.3	286	0	H/A	-52.8	271
1	12	1967	3.0	1618	3	8.9	-46	15.7	2755.3	12.2	286	1.0	281	11.2	286	0	F/A	-87.8	272
1	12	1967	3.0	17 1	3	11.3	-46	24.1	2764.0	7.0	285	1.0	281	6.0	286	0	S/A	-50.9	273
1	12	1967	3.0	17 4	3	11.3	-46	24.5	2764.4	12.0	286	1.0	281	11.0	286	0	F/A	-86.7	274
1	12	1967	3.0	1710	3	11.7	-46	25.6	2765.6	12.4	285	1.4	278	11.0	286	3124		-90.2	275
1	12	1967	3.0	1947	3	20.1	-46	57.1	2798.1	7.8	285	1.4	278	6.3	286	0	H/A	-56.5	276
1	12	1967	3.0	2130	3	23.5	-47	10.0	2811.4	11.3	299	1.4	278	10.0	302	0	A/CS	-74.4	277
1	12	1967	3.0	2133	3	23.8	-47	10.5	2812.0	7.8	298	1.4	278	6.4	302	0	H/A	-51.7	278
1	12	1967	3.0	22 0	3	25.4	-47	13.6	2815.5	12.2	299	1.4	278	10.9	302	0	F/A	-80.4	279
1	12	1967	3.0	23 0	3	31.4	-47	24.3	2827.7	7.3	297	1.4	278	6.0	302	0	H/A	-49.2	280
1	12	1967	3.0	2319	3	32.4	-47	26.4	2830.1	12.3	299	1.4	278	11.0	302	0	F/A	-81.2	281
1	12	1967	3.0	2326	3	33.1	-47	27.6	2831.5	12.9	302	1.8	305	11.0	302	3125		-81.9	282
2	12	1967	3.0	045	3	42.2	-47	42.0	2848.4	8.0	303	1.8	305	6.2	302	0	H/A	-50.5	283
2	12	1967	3.0	230	3	49.7	-47	53.8	2862.4	12.6	302	1.8	305	10.8	302	0	F/A	-80.5	284
2	12	1967	3.0	330	3	56.5	-48	4.5	2875.1	12.6	275	1.8	305	11.0	270	0	A/C	-94.1	285
2	12	1967	3.0	552	3	59.0	-48	34.2	2904.8	7.9	278	1.8	305	6.3	270	0	H/A	-58.9	286
2	12	1967	3.0	626	3	59.6	-48	38.7	2909.3	8.4	283	2.7	316	6.3	270	3127		-61.8	287
2	12	1967	3.0	732	4	1.7	-48	47.7	2918.6	8.4	288	3.0	327	6.3	270	3127		-60.1	288
2	12	1967	3.0	855	4	5.2	-48	58.8	2930.2	12.9	281	3.0	327	11.0	270	0	F/A	-94.9	289
2	12	1967	3.0	1227	4	14.2	-49	43.5	2975.7	8.3	288	3.0	327	6.2	270	0	H/A	-59.5	290
2	12	1967	3.0	1240	4	14.7	-49	45.2	2977.5	7.9	282	2.2	319	6.2	270	3129		-58.1	291
2	12	1967	3.0	16 5	4	20.6	-50	11.7	3004.5	8.1	331	2.2	319	5.9	335	0	A/C	-29.4	292
2	12	1967	3.0	1616	4	21.9	-50	12.4	3005.9	7.5	335	1.6	335	5.9	335	3130		-23.9	293
2	12	1967	3.0	1746	4	32.1	-50	17.1	3017.2	12.3	335	1.6	335	10.7	335	0	F/A	-39.2	294
2	12	1967	3.0	18 0	4	34.7	-50	18.4	3020.1	6.1	346	1.6	335	4.5	350	0	A/CS	-11.1	295
2	12	1967	3.0	18 4	4	35.1	-50	18.5	3020.5	11.8	348	1.6	335	10.3	350	0	F/A	-18.5	296
2	12	1967	3.0	19 0	4	45.9	-50	20.7	3031.5	11.3	347	1.2	321	10.3	350	3131		-19.1	297

2	12	1967	3.0	1930	4	51.4	-50	22.0	3037.2	5.6	344	1.2	321	4.5	350	0	S/A	-11.5	298
2	12	1967	3.0	1934	4	51.7	-50	22.1	3037.5	11.6	347	1.2	321	10.6	350	0	F/A	-19.6	299
2	12	1967	3.0	2048	5	5.7	-50	25.3	3051.8	12.2	348	1.7	338	10.6	350	3132		-19.1	300
2	12	1967	3.0	22 3	5	20.6	-50	28.4	3067.1	7.3	347	1.7	338	5.6	350	0	H/A	-12.3	301
2	12	1967	3.0	2350	5	33.2	-50	31.3	3080.0	12.1	348	1.7	338	10.5	350	0	F/A	-19.0	302
3	12	1967	3.0	022	5	39.6	-50	32.6	3086.5	11.9	350	1.4	346	10.5	350	3133		-15.5	303
3	12	1967	3.0	030	5	41.1	-50	32.9	3088.1	6.9	349	1.4	346	5.5	350	0	H/A	-9.8	304
3	12	1967	3.0	117	5	46.4	-50	33.9	3093.5	11.8	350	1.4	346	10.4	350	0	F/A	-15.4	305
3	12	1967	3.0	346	6	15.2	-50	39.3	3122.7	11.1	350	0.7	348	10.4	350	3134		-14.5	306
3	12	1967	3.0	4 0	6	17.7	-50	39.7	3125.3	10.8	350	0.7	348	10.1	350	0		-14.0	307
3	12	1967	3.0	536	6	34.7	-50	42.8	3142.5	10.8	351	0.7	7	10.1	350	3135		-12.7	308
3	12	1967	3.0	7 0	6	49.6	-50	45.1	3157.6	6.3	352	0.7	7	5.6	350	0	H/A	-6.6	309
3	12	1967	3.0	830	6	58.9	-50	46.4	3167.1	6.0	356	0.7	47	5.6	350	3137		-3.2	310
3	12	1967	3.0	844	7	0.4	-50	46.5	3168.5	10.6	353	0.7	47	10.2	350	0	F/A	-9.7	311
3	12	1967	3.0	10 0	7	13.7	-50	48.1	3181.9	10.9	353	0.7	47	10.4	350	0		-9.9	312
3	12	1967	3.0	10 6	7	14.8	-50	48.2	3183.0	9.9	351	0.5	150	10.4	350	3138		-11.7	313
3	12	1967	3.0	1230	7	38.3	-50	52.0	3206.9	4.9	352	0.5	150	5.4	350	0	H/A	-5.1	314
3	12	1967	3.0	14 2	7	45.8	-50	53.0	3214.4	10.0	324	0.5	150	10.6	324	0	A/CS	-44.1	315
3	12	1967	3.0	16 0	8	1.7	-51	4.8	3234.1	4.8	323	0.5	150	5.3	324	0	H/A	-21.5	316
3	12	1967	3.0	1617	8	2.8	-51	5.6	3235.5	0.5	150	0.5	150	0.0	500	0	H/T	2.1	317
3	12	1967	3.0	1710	8	2.4	-51	5.4	3236.0	1.8	192	1.8	192	0.0	500	3140		-2.7	318
3	12	1967	3.0	1926	7	58.5	-51	6.2	3239.9	4.4	307	1.8	192	5.4	324	0	H/A	-26.6	319
3	12	1967	3.0	1947	7	59.4	-51	7.5	3241.5	9.8	316	1.8	192	10.9	324	0	F/A	-50.7	320
3	12	1967	3.0	2142	8	13.0	-51	20.5	3260.2	9.4	315	2.1	187	10.9	324	3141		-49.8	321
3	12	1967	3.0	22 0	8	15.0	-51	22.5	3263.1	4.7	306	2.1	187	6.0	324	0	S/A	-28.3	322
3	12	1967	3.0	22 4	8	15.2	-51	22.8	3263.4	9.6	316	2.1	187	11.0	324	0	F/A	-49.8	323
3	12	1967	3.0	23 0	8	21.6	-51	29.1	3272.3	12.7	230	2.1	187	11.2	237	0	A/C	-72.1	324
4	12	1967	3.0	010	8	12.0	-51	40.5	3287.1	7.8	225	2.1	187	6.3	237	0	H/A	-41.3	325
4	12	1967	3.0	120	8	5.6	-51	47.1	3296.3	7.0	228	1.2	175	6.3	237	3142		-38.7	326
4	12	1967	3.0	153	8	3.0	-51	50.0	3300.1	11.9	232	1.2	175	11.3	237	0	F/A	-69.7	327
4	12	1967	3.0	438	7	42.9	-52	15.9	3332.8	11.7	238	0.5	266	11.3	237	3143		-74.1	328
4	12	1967	3.0	513	7	39.3	-52	21.8	3339.6	7.1	239	0.5	266	6.7	237	0	H/A	-45.7	329
4	12	1967	3.0	656	7	32.9	-52	32.3	3351.8	11.6	238	0.5	266	11.2	237	0	F/A	-73.4	330
4	12	1967	3.0	738	7	28.7	-52	39.3	3360.0	11.3	241	0.9	323	11.2	237	3145		-73.5	331
4	12	1967	3.0	830	7	24.0	-52	47.9	3369.7	11.3	254	0.9	323	11.0	250	0	A/C	-81.0	332
4	12	1967	3.0	9 0	7	22.4	-52	53.4	3375.4	11.7	264	0.9	323	11.3	260	0	A/C	-86.8	333
4	12	1967	3.0	922	7	22.0	-52	57.7	3379.7	12.1	265	1.3	315	11.3	260	3146		-90.0	334
4	12	1967	3.0	1014	7	21.1	-53	8.2	3390.1	7.0	269	1.3	315	6.1	260	0	H/A	-52.2	335
4	12	1967	3.0	11 4	7	21.0	-53	14.1	3396.0	7.5	270	1.9	307	6.1	260	3146		-56.1	336
4	12	1967	3.0	12 0	7	21.1	-53	21.2	3402.9	12.7	266	1.9	307	11.3	260	0	F/A	-94.3	337
4	12	1967	3.0	1250	7	20.4	-53	31.8	3413.5	12.1	269	1.9	330	11.3	260	3147		-90.5	338
4	12	1967	3.0	1254	7	20.3	-53	32.6	3414.3	7.2	275	1.9	330	6.3	260	0	H/A	-53.9	339
4	12	1967	3.0	1347	7	20.9	-53	39.0	3420.7	11.9	269	1.9	330	11.1	260	0	F/A	-88.8	340
4	12	1967	3.0	15 0	7	20.6	-53	53.6	3435.2	7.0	352	1.9	330	5.2	0	0	A/CS	-7.3	341
4	12	1967	3.0	1644	7	32.5	-53	55.3	3447.2	11.8	355	1.9	330	10.1	0	0	F/A	-7.8	342
4	12	1967	3.0	18 2	7	47.8	-53	56.6	3462.6	11.4	356	1.6	326	10.1	0	3149		-6.0	343
4	12	1967	3.0	19 0	7	58.9	-53	57.4	3473.6	11.1	356	1.6	326	9.7	0	0		-5.8	344
4	12	1967	3.0	19 8	8	0.3	-53	57.5	3475.1	11.4	358	1.7	345	9.7	0	3150		-3.0	345
4	12	1967	3.0	22 0	8	33.0	-53	58.8	3507.8	11.4	358	1.7	345	9.7	0	0		-3.0	346
4	12	1967	3.0	2244	8	41.3	-53	59.1	3516.1	10.8	2	1.2	23	9.7	0	3152		2.8	347
4	12	1967	3.0	2358	8	54.6	-53	58.6	3529.4	4.1	7	1.2	23	3.0	0	0	S/A	3.7	348
5	12	1967	3.0	0 0	8	54.7	-53	58.5	3529.6	10.9	2	1.2	23	9.8	0	0	F/A	2.8	349
5	12	1967	3.0	032	9	0.5	-53	58.3	3535.4	10.9	2	1.2	22	9.8	0	3153		2.8	350

5	12	1967	3.0	3 0	9	27.4	-53	57.2	3562.3	11.1	2	1.2	22	10.0	0	0		2.8	351
5	12	1967	3.0	528	9	54.8	-53	56.0	3589.7	10.7	4	1.0	53	10.0	0	3154		5.5	352
5	12	1967	3.0	6 0	10	0.5	-53	55.6	3595.4	10.9	4	1.0	53	10.2	0	0		5.6	353
5	12	1967	3.0	646	10	8.8	-53	54.9	3603.7	10.2	2	0.4	87	10.2	0	3155		2.6	354
5	12	1967	3.0	832	10	26.9	-53	54.2	3621.8	9.8	1	0.5	163	10.2	0	3156		1.2	355
5	12	1967	3.0	938	10	37.6	-53	54.1	3632.6	3.5	2	0.5	163	4.0	0	0	S/A	0.9	356
5	12	1967	3.0	944	10	38.0	-53	54.1	3632.9	5.5	1	0.5	163	6.0	0	0	H/A	0.7	357
5	12	1967	3.0	10 4	10	39.8	-53	54.0	3634.8	9.9	1	0.5	163	10.4	0	0	F/A	1.2	358
5	12	1967	3.0	13 0	11	9.0	-53	53.6	3663.9	10.0	1	0.5	163	10.4	0	0		1.2	359
5	12	1967	3.0	1522	11	32.6	-53	53.3	3687.6	9.7	0	0.7	173	10.4	0	3158		0.0	360
5	12	1967	3.0	17 0	11	48.5	-53	53.1	3703.5	10.1	276	0.7	173	10.3	280	0	A/C	-74.1	361
5	12	1967	3.0	1710	11	48.7	-53	54.8	3705.2	9.4	281	0.9	89	10.3	280	3159		-68.4	362
5	12	1967	3.0	1728	11	49.2	-53	57.7	3708.0	5.2	282	0.9	89	6.0	280	0	S/A	-37.3	363
5	12	1967	3.0	1730	11	49.3	-53	57.8	3708.2	9.8	281	0.9	89	10.6	280	0	F/A	-70.8	364
5	12	1967	3.0	2129	11	56.7	-54	36.9	3747.1	5.2	282	0.9	89	6.0	280	0	S/A	-37.6	365
5	12	1967	3.0	2130	11	56.7	-54	37.0	3747.2	9.9	281	0.9	89	10.7	280	0	F/A	-71.5	366
5	12	1967	3.0	2341	12	0.8	-54	58.7	3768.8	5.3	282	0.9	89	6.2	280	0	H/A	-38.6	367
5	12	1967	3.0	2348	12	0.9	-54	59.3	3769.4	5.2	288	1.3	65	6.2	280	3161		-36.5	368
6	12	1967	4.0	028	12	3.6	-55	7.7	3778.0	10.0	284	1.3	65	11.1	280	0	F/A	-71.8	369
6	12	1967	4.0	032	12	3.8	-55	8.3	3778.7	9.9	280	1.1	99	11.1	280	3162		-72.2	370
6	12	1967	4.0	3 0	12	8.0	-55	33.1	3803.2	9.9	280	1.1	99	11.0	280	0		-71.8	371
6	12	1967	4.0	336	12	9.1	-55	39.0	3809.2	9.6	278	1.4	113	11.0	280	3163		-70.3	372
6	12	1967	4.0	520	12	11.4	-55	55.9	3825.9	9.7	277	1.4	121	11.0	280	3164		-71.0	373
6	12	1967	4.0	6 0	12	12.2	-56	2.5	3832.3	9.8	277	1.4	121	11.1	280	0		-72.0	374
6	12	1967	4.0	646	12	13.2	-56	10.2	3839.9	10.0	278	1.2	114	11.1	280	3165		-72.8	375
6	12	1967	4.0	9 0	12	16.4	-56	32.8	3862.2	10.0	278	1.2	114	11.1	280	0		-72.9	376
6	12	1967	4.0	1016	12	18.3	-56	45.6	3874.9	10.3	279	0.8	112	11.1	280	3167		-75.2	377
6	12	1967	4.0	11 0	12	19.4	-56	53.2	3882.4	5.7	278	0.8	112	6.5	280	0	H/A	-41.8	378
6	12	1967	4.0	1134	12	19.9	-56	56.5	3885.7	10.0	279	0.8	112	10.8	280	0	F/A	-72.4	379
6	12	1967	4.0	12 2	12	20.6	-57	1.2	3890.3	10.3	277	0.8	147	10.8	280	3168		-75.1	380
6	12	1967	4.0	1440	12	23.9	-57	28.7	3917.4	5.2	274	0.8	147	5.7	280	0	H/A	-38.3	381
6	12	1967	4.0	1459	12	24.0	-57	30.4	3919.0	0.8	147	0.8	147	0.0	500	0	H/T	3.1	382
6	12	1967	4.0	1516	12	23.8	-57	30.3	3919.3	0.4	233	0.4	233	0.0	500	3169		-2.7	383
6	12	1967	4.0	17 0	12	23.4	-57	30.9	3920.0	0.8	143	0.8	143	0.0	500	3170		3.5	384
6	12	1967	4.0	1717	12	23.2	-57	30.8	3920.2	5.4	280	0.8	143	6.0	285	0	H/A	-39.5	385
6	12	1967	4.0	1728	12	23.4	-57	31.8	3921.2	10.5	282	0.8	143	11.1	285	0	F/A	-75.9	386
6	12	1967	4.0	18 8	12	24.9	-57	38.8	3928.2	9.9	281	1.4	133	11.1	285	3171		-71.3	387
6	12	1967	4.0	1823	12	25.4	-57	41.3	3930.7	9.3	292	1.4	133	10.7	295	0	A/C	-63.6	388
6	12	1967	4.0	1959	12	31.0	-57	55.4	3945.6	4.8	277	1.4	133	6.0	285	0	A/CS	-35.0	389
6	12	1967	4.0	20 1	12	31.1	-57	55.6	3945.8	9.8	281	1.4	133	11.1	285	0	F/A	-71.1	390
6	12	1967	4.0	23 0	12	36.7	-58	25.1	3975.1	9.8	281	1.4	133	11.1	285	0		-70.7	391
6	12	1967	4.0	2346	12	38.1	-58	32.7	3982.6	9.2	281	2.0	125	11.1	285	3173		-66.6	392
7	12	1967	4.0	1 0	12	40.2	-58	44.1	3994.0	9.3	281	2.0	125	11.1	285	0		-66.8	393
7	12	1967	4.0	238	12	43.1	-58	59.4	4009.2	8.9	284	2.1	108	11.1	285	3174		-63.7	394
7	12	1967	4.0	323	12	44.7	-59	6.0	4015.9	8.9	298	2.1	108	11.1	296	0	A/C	-58.0	395
7	12	1967	4.0	428	12	49.3	-59	14.8	4025.5	8.7	298	2.4	108	11.1	296	3175		-56.5	396
7	12	1967	4.0	530	12	53.5	-59	22.9	4034.5	8.0	310	2.4	108	10.2	305	0	A/C	-45.0	397
7	12	1967	4.0	547	12	55.0	-59	24.7	4036.8	9.8	315	2.4	108	12.0	310	0	A/C	-51.1	398
7	12	1967	4.0	554	12	55.8	-59	25.5	4037.9	11.8	309	0.3	165	12.0	310	3176		-67.1	399
7	12	1967	4.0	6 0	12	56.5	-59	26.5	4039.1	10.6	304	0.3	165	10.9	305	0	A/C	-64.8	400
7	12	1967	4.0	616	12	58.1	-59	28.9	4041.9	6.9	303	0.3	165	7.1	305	0	H/A	-42.5	401
7	12	1967	4.0	632	12	59.1	-59	30.4	4043.8	10.8	304	0.3	165	11.1	305	0	F/A	-66.0	402
7	12	1967	4.0	730	13	5.0	-59	39.4	4054.3	8.4	299	0.3	165	8.6	300	0	A/C	-53.7	403

7	12	1967	4.0	737	13	5.5	-59	40.2	4055.2	11.0	335	0.3	165	11.3	335	0	A/C	-34.1	404
7	12	1967	4.0	754	13	8.3	-59	41.6	4058.4	0.3	165	0.3	165	0.0	500	0	H/T	0.6	405
7	12	1967	4.0	8 2	13	8.2	-59	41.6	4058.4	4.6	334	0.3	165	4.9	335	0	S/A	-14.9	406
7	12	1967	4.0	813	13	9.0	-59	42.0	4059.2	0.3	165	0.3	165	0.0	500	0	H/T	0.6	407
7	12	1967	4.0	1144	13	8.0	-59	41.7	4060.3	10.5	355	0.3	165	10.8	355	0	F/A	-6.8	408
7	12	1967	4.0	1230	13	16.0	-59	42.4	4068.4	2.1	356	0.3	165	2.4	355	0	S/A	-1.1	409
7	12	1967	4.0	1235	13	16.2	-59	42.4	4068.5	0.3	165	0.3	165	0.0	500	0	H/T	0.6	410
7	12	1967	4.0	1311	13	16.0	-59	42.3	4068.7	5.5	356	0.3	165	5.8	355	0	H/A	-2.8	411
7	12	1967	4.0	1337	13	18.4	-59	42.5	4071.1	10.0	14	0.3	165	10.3	13	0	A/CS	17.7	412
7	12	1967	4.0	16 0	13	41.6	-59	36.7	4095.0	10.3	14	0.3	165	10.6	13	0		18.3	413
7	12	1967	4.0	19 0	14	11.7	-59	29.1	4126.0	10.2	14	0.3	165	10.4	13	0		17.9	414
7	12	1967	4.0	19 6	14	12.7	-59	28.8	4127.0	9.4	14	1.0	182	10.4	13	3180		16.7	415
7	12	1967	4.0	2052	14	28.8	-59	24.6	4143.7	9.4	11	1.1	213	10.4	13	3181		13.1	416
7	12	1967	4.0	2130	14	34.7	-59	23.5	4149.6	4.9	9	1.1	213	6.0	13	0	S/A	5.6	417
7	12	1967	4.0	2131	14	34.8	-59	23.4	4149.7	9.5	11	1.1	213	10.6	13	0	F/A	13.2	418
7	12	1967	4.0	23 0	14	48.6	-59	20.7	4163.8	9.9	12	0.7	213	10.6	13	3182		14.9	419
8	12	1967	4.0	0 0	14	58.3	-59	18.7	4173.7	9.6	12	0.7	213	10.3	13	0		14.5	420
8	12	1967	4.0	046	15	5.6	-59	17.1	4181.1	9.5	13	0.8	190	10.3	13	3183		15.5	421
8	12	1967	4.0	3 0	15	26.2	-59	12.1	4202.3	9.6	13	0.8	190	10.4	13	0		15.7	422
8	12	1967	4.0	332	15	31.2	-59	10.8	4207.5	9.4	16	1.1	169	10.4	13	3184		18.8	423
8	12	1967	4.0	518	15	47.2	-59	6.1	4224.1	9.3	12	1.1	200	10.4	13	3185		14.0	424
8	12	1967	4.0	6 0	15	53.6	-59	4.7	4230.6	9.0	12	1.1	200	10.1	13	0		13.5	425
8	12	1967	4.0	838	16	16.8	-58	59.5	4254.4	8.8	10	1.4	209	10.1	13	3186		11.0	426
8	12	1967	4.0	930	16	24.3	-58	58.1	4262.0	8.2	65	1.4	209	9.4	60	0	A/C	53.9	427
8	12	1967	4.0	937	16	24.7	-58	57.2	4262.9	4.3	70	1.4	209	5.5	60	0	S/A	29.5	428
8	12	1967	4.0	10 0	16	25.3	-58	55.6	4264.6	1.4	209	1.4	209	0.0	500	0	H/T	-5.1	429
8	12	1967	4.0	1024	16	24.8	-58	55.9	4265.1	0.5	192	0.5	192	0.0	500	3187		-0.8	430
8	12	1967	4.0	12 8	16	23.9	-58	56.1	4266.0	0.5	210	0.5	210	0.0	500	3188		-1.9	431
8	12	1967	4.0	1514	16	22.6	-58	56.8	4267.5	1.4	193	1.4	193	0.0	500	3189		-2.3	432
8	12	1967	4.0	1535	16	22.1	-58	57.0	4268.0	4.7	290	1.4	193	5.0	306	0	H/A	-32.0	433
8	12	1967	4.0	16 0	16	22.8	-58	58.9	4270.0	10.1	299	1.4	193	10.6	306	0	F/A	-64.1	434
8	12	1967	4.0	1630	16	25.2	-59	3.5	4275.0	5.6	293	1.4	193	6.0	306	0	S/A	-37.4	435
8	12	1967	4.0	1632	16	25.3	-59	3.7	4275.2	10.0	299	1.4	193	10.5	306	0	F/A	-63.2	436
8	12	1967	4.0	1658	16	27.3	-59	7.7	4279.6	9.5	301	1.3	169	10.5	306	3190		-59.2	437
8	12	1967	4.0	1816	16	33.7	-59	18.8	4292.0	9.6	302	1.2	163	10.5	306	3191		-58.6	438
8	12	1967	4.0	20 2	16	42.6	-59	33.8	4308.9	10.2	303	0.7	193	10.5	306	3192		-61.9	439
8	12	1967	4.0	2049	16	46.9	-59	40.8	4316.9	5.5	300	0.7	193	5.7	306	0	S/A	-34.4	440
8	12	1967	4.0	2130	16	48.7	-59	44.2	4320.6	10.1	302	0.7	193	10.3	306	0	F/A	-61.6	441
8	12	1967	4.0	2210	16	52.3	-59	50.1	4327.3	10.0	301	0.9	195	10.3	306	3193		-61.9	442
8	12	1967	4.0	2230	16	54.1	-59	53.1	4330.7	5.7	297	0.9	195	6.0	306	0	S/A	-36.7	443
8	12	1967	4.0	2232	16	54.1	-59	53.3	4330.8	10.1	301	0.9	195	10.4	306	0	F/A	-62.7	444
8	12	1967	4.0	2358	17	1.6	-60	6.3	4345.4	9.8	303	0.8	162	10.4	306	3194		-59.2	445
9	12	1967	4.0	0 0	17	1.8	-60	6.6	4345.7	9.9	303	0.8	162	10.5	306	0		-59.8	446
9	12	1967	4.0	234	17	15.7	-60	28.8	4371.1	9.6	305	1.0	132	10.5	306	3195		-56.5	447
9	12	1967	4.0	3 0	17	18.1	-60	32.4	4375.2	9.6	305	1.0	132	10.6	306	0		-56.8	448
9	12	1967	4.0	426	17	26.1	-60	44.2	4389.1	9.8	304	0.9	144	10.6	306	3196		-58.3	449
9	12	1967	4.0	6 0	17	34.8	-60	57.4	4404.4	9.7	304	1.0	145	10.6	306	3197		-57.6	450
9	12	1967	4.0	6 0	17	34.8	-60	57.4	4404.4	9.7	304	1.0	145	10.6	306	0		-57.8	451
9	12	1967	4.0	746	17	44.4	-61	12.3	4421.5	9.4	306	1.2	127	10.6	306	3198		-54.8	451
9	12	1967	4.0	838	17	49.2	-61	19.3	4429.7	4.8	306	1.2	127	6.0	306	0	H/A	-28.0	452
9	12	1967	4.0	9 0	17	50.2	-61	20.8	4431.5	9.4	306	1.2	127	10.6	306	0	F/A	-54.8	453
9	12	1967	4.0	1118	18	3.0	-61	39.3	4453.2	10.4	301	1.0	200	10.6	306	3199		-63.9	454
9	12	1967	4.0	12 0	18	6.7	-61	45.9	4460.4	10.5	301	1.0	200	10.7	306	0		-64.5	455

9	12	1967	4.0	1529	18	25.3	-62	19.0	4497.0	5.8	296	1.0	200	6.0	306	0	S/A	-37.4	456
9	12	1967	4.0	1531	18	25.4	-62	19.2	4497.2	10.4	301	1.0	200	10.6	306	0	F/A	-63.7	457
9	12	1967	4.0	18 0	18	38.6	-62	42.6	4523.0	10.4	301	1.0	200	10.6	306	0		-63.4	458
9	12	1967	4.0	1912	18	44.9	-62	53.9	4535.5	10.2	302	0.9	186	10.6	306	3201		-61.7	459
9	12	1967	4.0	21 0	18	54.6	-63	10.4	4553.8	10.3	302	0.9	186	10.7	306	0		-62.2	460
9	12	1967	4.0	23 0	19	5.4	-63	28.9	4574.4	3.6	294	0.9	186	4.0	306	0	S/A	-23.9	461
9	12	1967	4.0	23 3	19	5.5	-63	29.1	4574.6	10.5	302	0.9	186	10.9	306	0	F/A	-63.3	462
10	12	1967	4.0	3 0	19	27.4	-64	6.3	4616.0	10.4	302	0.9	186	10.8	306	0		-62.5	463
10	12	1967	4.0	324	19	29.6	-64	10.1	4620.2	10.2	304	0.7	159	10.8	306	3202		-59.9	464
10	12	1967	4.0	512	19	39.7	-64	26.2	4638.4	10.3	303	0.7	178	10.8	306	3203		-61.6	465
10	12	1967	4.0	553	19	43.6	-64	32.5	4645.5	5.4	300	0.7	178	5.9	306	0	H/A	-33.6	466
10	12	1967	4.0	640	19	45.7	-64	36.4	4649.8	0.7	178	0.7	178	0.0	500	0	H/T	0.1	467
10	12	1967	4.0	654	19	45.5	-64	36.4	4650.0	0.7	268	0.7	268	0.0	500	3204		-5.1	468
10	12	1967	4.0	842	19	45.5	-64	37.7	4651.2	0.3	238	0.3	238	0.0	500	3205		-2.2	469
10	12	1967	4.0	1034	19	45.2	-64	38.3	4651.8	0.3	248	0.3	248	0.0	500	3205		-2.2	470
10	12	1967	4.0	1216	19	45.0	-64	38.8	4652.3	0.7	132	0.7	132	0.0	500	3206		3.7	471
10	12	1967	4.0	13 8	19	44.6	-64	38.3	4652.8	5.3	302	0.7	132	6.0	303	0	H/A	-32.3	472
10	12	1967	4.0	1322	19	45.3	-64	39.4	4654.1	10.2	302	0.7	132	10.9	303	0	F/A	-61.6	473
10	12	1967	4.0	1510	19	55.2	-64	56.0	4672.5	9.8	302	1.1	134	10.9	303	3207		-58.8	474
10	12	1967	4.0	17 0	20	4.6	-65	12.2	4690.5	2.9	299	1.1	134	4.0	303	0	S/A	-18.0	475
10	12	1967	4.0	17 3	20	4.7	-65	12.4	4690.6	9.9	302	1.1	134	11.0	303	0	F/A	-59.5	476
10	12	1967	4.0	1816	20	11.0	-65	23.3	4702.7	10.0	304	1.1	113	11.0	303	3208		-58.5	477
10	12	1967	4.0	20 0	20	20.7	-65	38.5	4720.0	9.9	304	1.1	113	11.0	303	0		-58.0	478
10	12	1967	4.0	20 4	20	21.1	-65	39.1	4720.6	10.2	303	0.7	118	11.0	303	3209		-60.7	479
10	12	1967	4.0	2222	20	34.0	-66	0.1	4744.2	9.8	304	1.1	113	11.0	303	3210		-57.6	480
10	12	1967	4.0	2229	20	34.7	-66	1.1	4745.3	4.9	305	1.1	113	6.0	303	0	S/A	-28.4	481
10	12	1967	4.0	2231	20	34.7	-66	1.3	4745.5	10.0	304	1.1	113	11.1	303	0	F/A	-58.2	482
11	12	1967	4.0	0 0	20	43.0	-66	14.3	4760.2	10.1	304	1.1	113	11.2	303	0		-58.8	483
11	12	1967	4.0	0 8	20	43.8	-66	15.5	4761.6	10.0	302	1.2	132	11.2	303	3211		-59.7	484
11	12	1967	4.0	232	20	56.5	-66	37.3	4785.6	9.8	303	1.3	123	11.2	303	3212		-58.0	485
11	12	1967	4.0	3 0	20	59.0	-66	41.4	4790.1	9.8	303	1.3	123	11.2	303	0		-58.0	486
11	12	1967	4.0	422	21	6.3	-66	53.5	4803.6	9.9	302	1.3	134	11.2	303	3213		-59.2	487
11	12	1967	4.0	6 0	21	14.8	-67	8.3	4819.8	9.8	302	1.3	134	11.1	303	0		-58.5	488
11	12	1967	4.0	6 4	21	15.1	-67	8.9	4820.4	10.1	302	0.9	129	11.1	303	3214		-60.4	489
11	12	1967	4.0	754	21	25.1	-67	25.7	4839.0	10.8	303	0.3	141	11.1	303	3215		-63.6	490
11	12	1967	4.0	814	21	27.0	-67	29.0	4842.6	10.9	307	0.3	141	11.2	307	0	A/C	-61.2	491
11	12	1967	4.0	942	21	36.6	-67	42.8	4858.7	10.9	306	0.3	160	11.2	307	3216		-61.7	492
11	12	1967	4.0	11 0	21	44.9	-67	55.1	4872.8	10.9	306	0.3	160	11.2	307	0		-61.8	493
11	12	1967	4.0	1316	21	59.5	-68	16.7	4897.5	10.3	308	0.9	121	11.2	307	3217		-56.9	494
11	12	1967	4.0	14 0	22	4.1	-68	23.1	4905.1	10.2	308	0.9	121	11.1	307	0		-56.3	495
11	12	1967	4.0	16 4	22	17.0	-68	41.3	4926.2	10.2	311	1.1	90	11.1	307	3218		-53.9	496
11	12	1967	4.0	1727	22	26.2	-68	52.9	4940.4	5.2	314	1.1	90	6.0	307	0	S/A	-26.0	497
11	12	1967	4.0	1730	22	26.4	-68	53.1	4940.7	9.9	311	1.1	90	10.8	307	0	F/A	-52.3	498
11	12	1967	4.0	18 0	22	29.6	-68	57.1	4945.6	5.8	313	1.1	90	6.7	307	0	H/A	-29.7	499
11	12	1967	4.0	1818	22	30.8	-68	58.5	4947.4	1.1	90	1.1	90	0.0	500	0	H/T	7.9	500
11	12	1967	4.0	1912	22	30.8	-68	57.4	4948.4	0.8	82	0.8	82	0.0	500	3220		5.7	501
11	12	1967	4.0	2116	22	31.1	-68	55.7	4950.0	6.3	312	0.8	82	6.9	307	0	H/A	-32.8	502
11	12	1967	4.0	2130	22	32.1	-68	56.9	4951.5	10.2	310	0.8	82	10.8	307	0	F/A	-54.5	503
11	12	1967	4.0	2159	22	35.2	-69	1.0	4956.4	5.4	313	0.8	82	6.0	307	0	S/A	-27.8	504
11	12	1967	4.0	22 1	22	35.4	-69	1.1	4956.6	10.5	310	0.8	82	11.0	307	0	F/A	-56.0	505
11	12	1967	4.0	2320	22	44.3	-69	12.6	4970.4	10.0	307	1.1	125	11.0	307	3221		-55.3	506
12	12	1967	4.0	0 0	22	48.3	-69	18.3	4977.1	10.2	307	1.1	125	11.3	307	0		-56.5	507
12	12	1967	4.0	3 0	23	6.7	-69	44.8	5007.6	10.1	307	1.1	125	11.2	307	0		-56.1	508

12	12	1967	4.0	322	23	9.0	-69	48.0	5011.4	10.0	305	1.3	141	11.2	307	3223		-56.5	509
12	12	1967	4.0	510	23	19.3	-70	4.0	5029.3	9.7	301	1.8	158	11.2	307	3224		-57.5	510
12	12	1967	4.0	6 0	23	23.5	-70	11.5	5037.3	9.7	301	1.8	158	11.2	307	0		-57.4	511
12	12	1967	4.0	7 4	23	28.9	-70	21.1	5047.7	9.8	302	1.7	158	11.2	307	3225		-57.5	512
12	12	1967	4.0	9 0	23	38.9	-70	38.6	5066.6	9.9	302	1.7	158	11.3	307	0		-57.9	513
12	12	1967	4.0	1042	23	47.9	-70	54.2	5083.5	9.8	308	1.4	120	11.3	307	3226		-53.5	514
12	12	1967	4.0	12 0	23	55.8	-71	5.2	5096.3	9.9	308	1.4	120	11.3	307	0		-53.6	515
12	12	1967	4.0	1230	23	58.8	-71	9.5	5101.2	10.8	311	0.8	75	11.3	307	3227		-56.1	516
12	12	1967	4.0	15 0	24	16.3	-71	32.0	5128.2	4.5	315	0.8	75	5.0	307	0	H/A	-22.1	517
12	12	1967	4.0	1512	24	17.0	-71	32.7	5129.1	0.8	75	0.8	75	0.0	500	0	H/T	5.8	518
12	12	1967	4.0	1747	24	17.5	-71	30.4	5131.3	6.0	313	0.8	75	6.5	307	0	H/A	-30.3	519
12	12	1967	4.0	1759	24	18.4	-71	31.3	5132.5	10.6	311	0.8	75	11.1	307	0	F/A	-55.0	520
12	12	1967	4.0	1818	24	20.5	-71	34.1	5135.8	9.7	312	1.7	95	11.1	307	3229		-49.7	521
12	12	1967	4.0	2010	24	32.7	-71	48.9	5154.0	9.7	314	1.9	87	11.1	307	3230		-47.8	522
12	12	1967	4.0	21 0	24	38.4	-71	55.3	5162.1	9.8	314	1.9	87	11.2	307	0		-48.3	523
12	12	1967	4.0	2232	24	48.9	-72	7.1	5177.1	10.4	312	1.2	82	11.2	307	3231		-52.8	524
12	12	1967	4.0	2253	24	51.3	-72	10.1	5180.7	9.9	271	1.2	82	11.1	270	0	A/C	-67.8	525
12	12	1967	5.0	2320	24	51.5	-72	26.0	5195.1	10.1	269	1.1	96	11.1	270	3232		-68.7	526
13	12	1967	5.0	0 0	24	51.4	-72	33.4	5201.8	10.2	269	1.1	96	11.2	270	0		-69.6	527
13	12	1967	5.0	3 0	24	51.1	-73	7.0	5232.4	10.3	269	1.1	96	11.3	270	0		-70.1	528
13	12	1967	5.0	5 2	24	50.8	-73	30.0	5253.2	10.2	268	1.2	112	11.3	270	3234		-69.8	529
13	12	1967	5.0	518	24	50.7	-73	33.0	5255.9	5.6	265	1.2	112	6.6	270	0	H/A	-37.9	530
13	12	1967	5.0	7 0	24	50.0	-73	43.4	5265.4	6.5	268	0.2	138	6.6	270	3235		-44.3	531
13	12	1967	5.0	830	24	49.7	-73	54.1	5275.1	6.0	92	0.2	138	5.8	90	0	A/C	41.0	532
13	12	1967	5.0	846	24	49.7	-73	52.3	5276.7	6.2	84	0.7	27	5.8	90	3236		42.2	533
13	12	1967	5.0	9 5	24	49.9	-73	50.2	5278.7	0.7	27	0.7	27	0.0	500	0	H/T	2.3	534
13	12	1967	5.0	12 3	24	51.8	-73	49.1	5280.8	5.3	83	0.7	27	4.9	90	0	H/A	36.0	535
13	12	1967	5.0	1226	24	52.0	-73	46.9	5282.8	6.3	85	1.4	67	4.9	90	3237		42.8	536
13	12	1967	5.0	1310	24	52.4	-73	41.8	5287.4	5.4	244	1.4	67	6.8	245	0	A/C	-33.4	537
13	12	1967	5.0	1428	24	49.4	-73	48.8	5294.5	1.4	67	1.4	67	0.0	500	0	H/T	9.2	538
13	12	1967	5.0	15 4	24	49.7	-73	48.0	5295.3	0.7	91	0.7	91	0.0	500	3238		4.8	539
13	12	1967	5.0	1618	24	49.7	-73	47.1	5296.1	5.4	292	0.7	91	6.0	290	0	H/A	-34.2	540
13	12	1967	5.0	1626	24	50.0	-73	47.8	5296.9	10.0	291	0.7	91	10.6	290	0	F/A	-63.6	541
13	12	1967	5.0	1648	24	51.3	-73	51.5	5300.5	9.4	291	1.2	101	10.6	290	3239		-60.0	542
13	12	1967	5.0	17 0	24	52.0	-73	53.5	5302.4	4.8	292	1.2	101	6.0	290	0	S/A	-30.4	543
13	12	1967	5.0	17 1	24	52.0	-73	53.6	5302.5	9.9	291	1.2	101	11.1	290	0	F/A	-63.5	544
13	12	1967	5.0	20 4	25	2.9	-74	24.7	5332.8	10.2	290	1.0	112	11.1	290	3240		-65.1	545
13	12	1967	5.0	2130	25	7.9	-74	39.9	5347.3	5.0	290	1.0	112	6.0	290	0	S/A	-32.3	546
13	12	1967	5.0	2132	25	7.9	-74	40.0	5347.5	10.3	290	1.0	112	11.3	290	0	F/A	-66.0	547
14	12	1967	5.0	0 0	25	16.5	-75	6.4	5372.9	10.4	290	1.0	112	11.3	290	0		-66.3	548
14	12	1967	5.0	016	25	17.5	-75	9.3	5375.6	10.3	286	1.3	144	11.3	290	3242		-67.2	549
14	12	1967	5.0	222	25	23.3	-75	32.2	5397.2	9.8	289	1.6	117	11.3	290	3243		-62.9	550
14	12	1967	5.0	3 0	25	25.3	-75	38.7	5403.4	9.8	289	1.6	117	11.3	290	0		-62.7	551
14	12	1967	5.0	4 8	25	28.9	-75	50.3	5414.4	10.3	288	1.1	132	11.3	290	3244		-66.9	552
14	12	1967	5.0	520	25	32.7	-76	3.4	5426.8	10.4	277	1.1	132	11.3	280	0	A/C	-70.2	553
14	12	1967	5.0	550	25	33.3	-76	9.1	5432.0	10.5	280	0.8	99	11.3	280	3245		-70.4	554
14	12	1967	5.0	754	25	37.1	-76	32.9	5453.8	10.6	279	0.7	109	11.3	280	3246		-71.1	555
14	12	1967	5.0	8 0	25	37.3	-76	34.0	5454.8	10.6	279	0.7	109	11.3	280	0		-71.3	556
14	12	1967	5.0	952	25	40.5	-76	55.7	5474.7	10.6	278	0.8	128	11.3	280	3247		-71.1	557
14	12	1967	5.0	1046	25	41.8	-77	6.2	5484.2	10.5	286	0.8	128	11.3	288	0	A/C	-68.4	558
14	12	1967	5.0	1140	25	44.5	-77	16.2	5493.6	10.6	287	0.6	123	11.3	288	3248		-69.1	559
14	12	1967	5.0	14 8	25	52.2	-77	44.1	5519.9	10.0	286	1.3	120	11.3	288	3249		-65.0	560
14	12	1967	5.0	1444	25	53.9	-77	50.5	5525.9	10.1	280	1.3	120	11.3	282	0	A/C	-67.3	561

14	12	1967	5.0	17 0	25	57.7	-78	15.5	5548.7	10.0	280	1.3	120	11.2	282	0		-66.6	562
14	12	1967	5.0	1724	25	58.4	-78	19.9	5552.7	10.4	281	0.9	116	11.2	282	3251		-68.8	563
14	12	1967	5.0	1914	26	1.9	-78	40.7	5571.7	10.3	285	1.1	74	11.2	282	3252		-67.3	564
14	12	1967	5.0	2019	26	4.8	-78	52.7	5582.8	10.6	298	1.1	74	11.5	294	0	A/C	-63.6	565
14	12	1967	5.0	2030	26	5.7	-78	54.6	5584.8	10.4	285	1.1	74	11.3	282	0	A/C	-67.8	566
14	12	1967	5.0	2133	26	8.5	-79	6.3	5595.7	10.1	261	1.1	74	11.2	260	0	A/C	-67.7	567
14	12	1967	5.0	2332	26	5.2	-79	28.4	5615.8	10.3	282	4.3	13	11.2	260	3253		-68.2	568
15	12	1967	5.0	0 0	26	6.2	-79	33.7	5620.6	10.3	282	4.3	13	11.2	260	0		-68.3	569
15	12	1967	5.0	223	26	11.5	-80	0.4	5645.2	7.0	177	4.3	13	11.2	183	0	A/C	2.5	570
15	12	1967	5.0	314	26	5.6	-80	0.0	5651.2	5.4	197	6.1	350	11.2	183	3254		-10.7	571
15	12	1967	5.0	4 0	26	1.6	-80	1.4	5655.3	2.0	279	6.1	350	5.8	190	0	A/CS	-13.8	572
15	12	1967	5.0	425	26	1.7	-80	2.3	5656.2	6.0	210	6.1	350	11.3	190	0	F/A	-20.2	573
15	12	1967	5.0	5 0	25	58.7	-80	4.3	5659.7	6.5	173	5.4	31	11.3	190	3255		5.4	574
15	12	1967	5.0	5 0	25	58.7	-80	4.3	5659.7	5.7	209	5.4	31	11.1	210	0	A/C	-18.8	575
15	12	1967	5.0	5 7	25	58.1	-80	4.6	5660.3	6.8	161	5.4	31	11.1	183	0	A/C	14.9	575
15	12	1967	5.0	548	25	53.7	-80	3.0	5665.0	6.8	161	0.0	0	11.1	183	3256		14.9	576

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// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2018        2018        0000

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*ONE WORD INTEGERS
*LISTALL
*TRANSFERTRACE
*ARITHMETICTRACE
C     MERN2
C     ADDITIONAL SUBROUTINES ANNO,CURNT,PDIS,PTIM
C     MERN2 WITH MERN3 DRAWS TRACK FROM NAVIGATION DATA (STORED
C     PREVIOUSLY ON DISK) ON MERCATOR CHART
C     NOTE BOTH MERN2 AND MERN3 CALL FOR INPUT
C     THESE COMMENT CARDS WILL SERVE FOR BOTH MERN2 AND MERN3
C     WLONG,ELONG,SLAT,ANLAT,SCALE - SEE MEGRW
C     JG IS NON ZERO TO CALL MEGRW TO DRAW INSIDE GRID AND ANNOTATE.
C     IGRI, IMIN, IGG ARE MEGRW ARGUMENTS (SEE MEGRW)
C     IF MEGRW IS NOT CALLED IGRI, IMIN, AND IGG ARE NOT USED AND CAN BE
C     ZERO.
C     IF JSA IS NON ZERO BUT JSB IS ZERO, HR AND MIN ARE ANNOTATED FOR
C     EACH NAVIGATION POINT.
C     IF THE NAVIGATION DATA HAS BEEN STORED BY FIXPI, EACH FIX IS NOTED
C     WITH AN ASTERISK. DAY,MONTH,YEAR,AND TIME ZONE ARE ANNOTATED FOR
C     THE FIRST FIX OF EACH DAY.
C     IF JSA AND JSB ARE BOTH NON ZERO THE ONLY ANNOTATIONS MADE ARE THE
C     DAY,HR,AND,MIN OF THE FIRST FIX OF EACH DAY.
C     JSM IS NON ZERO TO ANNOTATE MILES ALONG THE TRACK. THE ANNOTATION
C     IS MADE EVERY JSM MILES.
C      JST IS NON ZERO TO INDICATE EVERY HR ALONG THE TRACK WITH A CROSS
C     JCUR IS NON ZERO TO PLOT CURRENT VECTORS AT THE SCALE OF
C     1 INCH=1KNOT MIDWAY BETWEEN FIXES IF THE NAVIGATION DATA HAS BEEN
C     GENERATED BY FIXPI. CURRENT VECTORS ARE NOT PLOTTED IN ANY EVENT
C     IF LARGER THAN 5 KNOTS.
C     MAKE JBLUE NON ZERO WHEN SCALE OF PLOT IS GREATER THAN 1 INCH=
C     1 DEGREE.
C     IF LFST=0 PROGRAM WILL START FROM FIRST NAVIGATION POINT,
C     OTHERWISE IT WILL SKIP LFST POINTS.
C     IF LLST=0 IT WILL PLOT UP TO THE LAST NAVIGATION POINT,OTHERWISE
C     UP TO LLST.
C     JRET=1 TO GO TO NEXT GRID TO PLOT PRESENT LEG. NEXT GRID DATA IS
C     READ.
C     JRET=2 PROGRAM EXITS AND PEN GOES TO ORIGIN. USE TO PLOT NEW LEG
C     IN SAME GRID.  NEW FILES CARDS NEEDED.
C     JRET=3 PROGRAM EXITS AND PEN GOES TO NEW ORIGIN. USE TO PLOT NEW
C     LEG IN NEW GRID. NEW FILES CARDS NEEDED.
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      READ(8,700)WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG,JG
  700 FORMAT(5F10.1,4I5)
```

```
      CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      IF(JG)901,902,901
  901 CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
      CALL FPLOT(1,0.0,0.0)
  902 CALL LINK(MERN3)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88       IGRI(I )=0000       IMIN(I )=0001        IGG(I )=0002         JG(I )=0003

STATEMENT ALLOCATIONS
 700  =0008  901  =0047  902  =0056

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   FPLOT   FLD     FSTO    TYPEZ   SIIF    CARDZ   WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ
 SDFIO

REAL CONSTANTS
  .000000E 00=0004

INTEGER CONSTANTS
     8=0006      1=0007

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES      4  PROGRAM     86

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2018        2018        0000

// FOR
*ARITHMETICTRACE
*TRANSFER TRACE
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*ONE WORD INTEGERS
C MERN3
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      DEFINE FILE 3(1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      READ(8,704)JSA,JSB,JSM,JST,JBLUE,JRET,JCUR,LFST,LLST
  704 FORMAT(9I5)
      IF(LFST)13,13,14
   13 L=1
      GO TO 15
   14 L=LFST+1
   15 CALL AMAY
  206 READ(3'1)DIST1,LQ,TD,CRUIS,JBSYR
      IF(LLST)2061,2061,2062
 2062 LQ=LLST
 2061 CONTINUE
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
  895 READ(1'L)TT1,XLAT1,XLON1,DRFT1,TZ1
      N=0
      IF(JCUR)7,8,7
    7  CALL CRNT(2,XLAT1,XLON1,DIST1,DRFT1,N,WLONG,ELONG,SLAT,ANLAT,
     1 SCALE)
    8 JDAY1=0
      THETA=0.0
      X9=0.0
      Y9=0.0
      MON1=0
      JYR1=0
      JHR1=0
      MIN1=0
      XXE=0
      XXN=0
      XXD=0
      JDAY2=0
      MON2=0
      JYR2=0
      JHR2=0
      MIN2=0
```

```
      INDEX=1
      JRX=1
      JFIX=1
      KDAY=0
      IREP=0
      PI=3.1415927
      CALL DXX(TT1,TZ1,JDAY1,MON1,JYR1,JHR1,MIN1,JBSYR)
      HR1=JHR1
      PIN1=MIN1
      AA1=TT1-HR1-PIN1/60.
  902 X1=ALONG(XLON1,WLONG,ELONG,SCALE)
      Y1=ALATI(XLAT1,SLAT,ANLAT)
  416 IF(X1)302,303,303
  303 IF(Y1)302,304,304
  304 CALL FPLOT(-2,X1,Y1)
      X7=X1
      Y7=Y1
    6 IF(JSA)305,306,305
  305 CALL ANNO(X1,Y1,JHR1,MIN1,JDAY1,KDAY,MON1,JYR1,TZ1,X9,Y9,THETA,JSB
     1)
      IF(JSB)306,3051,306
 3051 GO TO(403,306),JFIX
  403 CALL FCHAR(X1,Y1,.08,.08,THETA)
      WRITE(7,109)
  109 FORMAT(5H     *)
  306 CALL FPLOT(-2,X1,Y1)
      GO TO(503,201),INDEX
  502 JRX=1
      CALL FPLOT(1,SAVX1,SAVY1)
  503 L=L+1
      READ(1'L)TT2,XLAT2,XLON2,DRFT2,TZ2
      CALL DXX(TT2,TZ2,JDAY2,MON2,JYR2,JHR2,MIN2,JBSYR)
      HR2=JHR2
      PIN2=MIN2
      AA2=TT2-HR2-PIN2/60.
      X2=ALONG(XLON2,WLONG,ELONG,SCALE)
      Y2=ALATI(XLAT2,SLAT,ANLAT)
      CALL COMDI(XLAT1,XLON1,XLAT2,XLON2,XXE,XXN,XXD)
      DIST2=DIST1+XXD
      IF(DRFT1-DRFT2)400,401,400
  400 JFIX=1
      GO TO 402
  401 JFIX=2
  402 IF(JSM)308,309,308
  308 CALL PDIS   (JSM,DIST1,DIST2,XLAT1,XLAT2,XLON1,XLON2,XXD,SLAT,
     1   ANLAT,WLONG,ELONG,SCALE,X1,Y1,PI)
  309 IF(JST)318,325,318
  318 CALL                PTIM(AA2,HR2,TT1,XLAT1,XLAT2,TT2,SLAT,ANLAT,
     1 XLON1,XLON2,WLONG,ELONG,SCALE,JBLUE)
  325 IF(X1)3251,3252,3252
 3252 IF(Y1)3251,3253,3253
```

```
 3253 CALL FPLOT(-2,X1,Y1)
 3251 IF(JCUR)9,10,9
    9  CALL CRNT(JFIX,XLAT2,XLON2,DIST2,DRFT1,N,WLONG,ELONG,SLAT,ANLAT,
     1 SCALE)
   10 KDAY=JDAY1
      XLAT1=XLAT2
      XLON1=XLON2
      JDAY1=JDAY2
      MON1=MON2
      JYR1=JYR2
      JHR1=JHR2
      MIN1=MIN2
      HR1=HR2
      PIN1=PIN2
      TT1=TT2
      AA1=AA2
      SAVX1=X1
      SAVY1=Y1
      X1=X2
      Y1=Y2
      DIST1=DIST2
      TZ1=TZ2
      DRFT1=DRFT2
      IF(L-LQ)416,417,417
  417 INDEX=2
      JRX=4
      GO TO 416
  302 CALL FPLOT(1,X7,Y7)
      GO TO(503,201),INDEX
  201 XNEX=ALONG(ELONG,WLONG,ELONG,SCALE)+4.
      GO TO(551,552,551),JRET
  551 CALL FPLOT(1,XNEX,0.0)
      GO TO(553,553,554),JRET
  553 CALL LINK(MERN2)
  552 CALL FPLOT(1,0.0,0.0)
  554 CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88      DIST1(R )=000E         TD(R )=0010      CRUIS(R )=0012        TT1(R )=0014
 XLAT1(R )=0016      XLON1(R )=0018      DRFT1(R )=001A        TZ1(R )=001C      THETA(R )=001E         X9(R )=0020
    Y9(R )=0022        XXE(R )=0024        XXN(R )=0026        XXD(R )=0028         PI(R )=002A        HR1(R )=002C
  PIN1(R )=002E        AA1(R )=0030         X1(R )=0032         Y1(R )=0034         X7(R )=0036         Y7(R )=0038
 SAVX1(R )=003A      SAVY1(R )=003C        TT2(R )=003E      XLAT2(R )=0040      XLON2(R )=0042      DRFT2(R )=0044
   TZ2(R )=0046        HR2(R )=0048       PIN2(R )=004A        AA2(R )=004C         X2(R )=004E         Y2(R )=0050
 DIST2(R )=0052       XNEX(R )=0054       INXT(I )=0058        JSA(I )=0059       JSB(I )=005A        JSM(I )=005B
   JST(I )=005C      JBLUE(I )=005D       JRET(I )=005E       JCUR(I )=005F      LFST(I )=0060       LLST(I )=0061
     L(I )=0062         LQ(I )=0063      JBSYR(I )=0064          N(I )=0065     JDAY1(I )=0066      MON1(I )=0067
  JYR1(I )=0068       JHR1(I )=0069       MIN1(I )=006A      JDAY2(I )=006B      MON2(I )=006C       JYR2(I )=006D
  JHR2(I )=006E       MIN2(I )=006F      INDEX(I )=0070        JRX(I )=0071      JFIX(I )=0072       KDAY(I )=0073
  IREP(I )=0074
```

```
UNREFERENCED STATEMENTS
 206     895     902     6       502

STATEMENT ALLOCATIONS
 704  =0089  109  =008C  13   =00C4  14   =00CA  15   =00D0  206  =00D2  2062 =00E4  2061 =00E8  7002 =00EF  7001 =00F6
 7003 =00FA  895  =00FA  7    =0110  8    =011D  902  =019A  416  =01A9  303  =01AE  304  =01B3  6    =01C5  305  =01CA
 3051 =01DE  403  =01E3  306  =01EE  502  =01FD  503  =0206  400  =0260  401  =0266  402  =026A  308  =026F  309  =0281
 318  =0286  325  =0296  3252 =029B  3253 =02A0  3251 =02AA  9    =02AF  10   =02BC  417  =030F  302  =0319  201  =0323
 551  =0333  553  =033E  552  =0342  554  =0347

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    CRNT    DXX     ALONG   ALATI   FPLOT   ANNO    FCHAR   COMDI   PDIS    PTIM    FSUB    FDIV    FLD     FSTO
 FSBR    SFAR    SIAR    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   CARDZ   WCHRI   READZ   SRED    SWRT    SCOMP   SFIO
 SIOI    PRNZ    SDFIO   SDRED   SDF     SDI

REAL CONSTANTS
  .000000E 00=0076    .314159E 01=0078    .600000E 02=007A    .800000E-01=007C    .400000E 01=007E

INTEGER CONSTANTS
     8=0080      1=0081      3=0082   1959=0083   1970=0084      0=0085      2=0086      7=0087      4=0088

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES    118  PROGRAM    722

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2018        2018        0000

// FOR
*LISTALL
*ONE WORD INTEGERS
      SUBROUTINE ANNO(X1,Y1,JHR1,MIN1,JDAY1,KDAY,MON1,JYR1,TZ1,X9,Y9,THE
     1TA,JSB)
      COMMON AM(12),AY(11),B(160)
      IF(JSB)201,202,201
  201 FACT=FABS(X1-X9)-FABS(Y1-Y9)
       X9=X1
       Y9=Y1
      Y1P=Y1-.09
      JUJU=JHR1*100+MIN1
      IF(JDAY1-KDAY)203,306,203
  203 CALL MEPLO(0,X1,Y1)
      IF(FACT)605,605,606
  605 X1P=X1-.09
      Y2P=Y1P
       X2P=X1+0.21
      X3P=X2P+.16
      Y3P=Y2P
      X2P1=X2P
      X2P2=X2P+0.08
      X2P3=X2P+0.16
      X2P4=X2P+0.24
      Y2P1=Y2P
      Y2P2=Y2P
      Y2P3=Y2P
      Y2P4=Y2P
       THETA=0.0
       GO TO 607
  606 X1P=X1+0.03
      X2P=X1P
      Y2P=Y1P+.29
      Y3P=Y2P+.16
      X3P=X2P
      X2P1=X2P
      X2P2=X2P
      X2P3=X2P
      X2P4=X2P
      Y2P1=Y2P
      Y2P2=Y2P+0.08
      Y2P3=Y2P+0.16
      Y2P4=Y2P+0.24
      THETA=1.5707
  607 CALL FCHAR(X1P,Y1P,0.12,0.12,THETA)
       WRITE(7,805)JDAY1
```

```
  805 FORMAT(I3)
      JHR1A=JHR1/10
      JHR1B=JHR1-JHR1A*10
      MIN1A=MIN1/10
      MIN1B=MIN1-MIN1A*10
      CALL FCHAR(X2P1,Y2P1,0.08,0.08,THETA)
      WRITE(7,901)JHR1A
  901 FORMAT(I2)
      CALL FCHAR(X2P2,Y2P2,0.08,0.08,THETA)
      WRITE(7,902)JHR1B
  902 FORMAT(I2)
      CALL FCHAR(X2P3,Y2P3,0.08,0.08,THETA)
      WRITE(7,903)MIN1A
  903 FORMAT(I2)
      CALL FCHAR(X2P4,Y2P4,0.08,0.08,THETA)
      WRITE(7,904)MIN1B
  904 FORMAT(I2)
       GO TO 306
  202 CALL MEPLO(0,X1,Y1)
      FACT=FABS(X1-X9)-FABS(Y1-Y9)
      X9=X1
      Y9=Y1
      Y1P=Y1-.03
      JUJU=JHR1*100+MIN1
      IF(FACT)405,405,406
  405 X1P=X1-.03
      THETA=0.0
      GO TO 407
  406 X1P=X1+.03
      THETA=1.5707
  407 CALL FCHAR(X1P,Y1P,0.06,0.06,THETA)
      WRITE(7,705)JUJU
  705 FORMAT(I5)
      IF(JDAY1-KDAY)307,306,307
  307 X1P=X1P+0.4
      Y1P=Y1-.1
      CALL FCHAR(X1P,Y1P,0.2,0.2,0.0)
      WRITE(7,703)JDAY1,MON1,JYR1,TZ1
  703 FORMAT(I3,I3,I5,F6.1)
  306 RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92  FACT(R )=0000        Y1P(R )=0002        X1P(R )=0004
   Y2P(R )=0006        X2P(R )=0008        X3P(R )=000A        Y3P(R )=000C       X2P1(R )=000E       X2P2(R )=0010
  X2P3(R )=0012       X2P4(R )=0014       Y2P1(R )=0016       Y2P2(R )=0018       Y2P3(R )=001A       Y2P4(R )=001C
  JUJU(I )=0024      JHR1A(I )=0025      JHR1B(I )=0026      MIN1A(I )=0027      MIN1B(I )=0028

STATEMENT ALLOCATIONS
 805  =004A  901  =004C  902  =004E  903  =0050  904  =0052  705  =0054  703  =0056  201  =00A7  203  =00DC  605  =00E6
 606  =012C  607  =0170  202  =01D7  405  =0210  406  =021C  407  =0226  307  =0239  306  =0258
```

```
FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FABS    MEPLO   FCHAR   FSUB    FLD     FSTO    FSBR    SWRT    SCOMP   SIOF    SIOI    SUBIN

REAL CONSTANTS
  .900000E-01=002A    .210000E 00=002C    .160000E 00=002E    .800000E-01=0030    .240000E 00=0032    .000000E 00=0034
  .300000E-01=0036    .290000E 00=0038    .157070E 01=003A    .120000E 00=003C    .600000E-01=003E    .400000E 00=0040
  .100000E 00=0042    .200000E 00=0044

INTEGER CONSTANTS
   100=0046      0=0047      7=0048     10=0049

CORE REQUIREMENTS FOR ANNO
 COMMON    366  VARIABLES     42  PROGRAM .   560

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2018        2018        0000

// FOR
*LISTALL
*ONE WORD INTEGERS
C     CURNT     IBM 1130
C     SUBROUTINE TO PLOT CURRENT VECTOR ON MERCATOR PROJECTION
       SUBROUTINE CRNT(JFIX,ZLAT,ZLONG,ZDIST,DRIFT,N,WLONG,ELONG,SLAT,AN
     1LAT,SCALE)
      DIMENSION XLAT(30),XLONG(30),DIST(30)
      COMMON AM(12),AY(11),B(160)
      TPLAT=ALATI(ANLAT,SLAT,ANLAT)
      N=N+1
      XLAT(N)=ZLAT
      XLONG(N)=ZLONG
      DIST(N)=ZDIST
      GO TO (1,2),JFIX
    1 DISTP=(DIST(N)-DIST(1))/2.+DIST(1)
      DO 3 NN=1,N
      IF(DIST(NN)-DISTP)3,3,4
    3 CONTINUE
    4 A=(DISTP-DIST(NN-1))/(DIST(NN)-DIST(NN-1))
      PLAT=XLAT(NN-1)+(XLAT(NN)-XLAT(NN-1))*A
      PLAT=ALATI(PLAT,SLAT,ANLAT)
```

```
      IF(PLAT)5,6,6
    6 PLONG=XLONG(NN-1)+(XLONG(NN)-XLONG(NN-1))*A
      PLONG=ALONG(PLONG,WLONG,ELONG,SCALE)
      IF(PLONG)5,7,7
    7 KAZM=DRIFT/10.
      SPEED=DRIFT-KAZM*10
      IF(SPEED-5.)21,21,22
   22 XA=PLONG-1.
      XB=PLONG+1.
      YA=PLAT-1.
      YB=PLAT+1.
      GO TO 5
   21 CONTINUE
      Y=SPEED*COS(KAZM*.01745329)/2.
      X=SPEED*SIN(KAZM*.01745329)/2.
      X1=PLONG-X
      Y1=PLAT-Y
      IF(Y1+1.)22,211,211
  211 CONTINUE
      X2=PLONG+X
      Y2=PLAT+Y
      IF(Y2-TPLAT-1.)212,212,22
  212 CONTINUE
      CALL FPLOT(1,X1,Y1)
      CALL FPLOT(2,X2,Y2)
      THETA=-(KAZM*.01745329+3.1415926)
      CALL FCHAR(X2-.04*COS(THETA),Y2-.04*SIN(THETA),.08,.08,THETA)
      WRITE(7,10)
   10 FORMAT(1HV)
      XX=ALONG(XLONG(N-1),WLONG,ELONG,SCALE)
      IF(XX)8,9,9
    9 YY=ALATI(XLAT(N-1),SLAT,ANLAT)
      IF(YY)8,11,11
    8 CALL FPLOT(-2,PLONG,PLAT)
      GO TO 5
   11 CALL FPLOT(-2,XX,YY)
    5 XLAT(1)=XLAT(N)
      XLONG(1)=XLONG(N)
      DIST(1)=DIST(N)
      N=1
    2 RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92  XLAT(R )=003A-0000 XLONG(R )=0076-003C  DIST(R )=00B2-0078
 TPLAT(R )=00B4      DISTP(R )=00B6          A(R )=00B8       PLAT(R )=00BA      PLONG(R )=00BC      SPEED(R )=00BE
    XA(R )=00C0          XB(R )=00C2        YA(R )=00C4         YB(R )=00C6          Y(R )=00C8          X(R )=00CA
    X1(R )=00CC          Y1(R )=00CE        X2(R )=00D0         Y2(R )=00D2      THETA(R )=00D4         XX(R )=00D6
    YY(R )=00D8          NN(I )=00DE      KAZM(I )=00DF

STATEMENT ALLOCATIONS
 10    =00F6  1    =014B  3    =016C  4    =0175  6    =01A9  7    =01CC  22   =01E4  21   =01FE  211  =0231  212  =0246
 9     =028E  8    =02A4  11   =02B0  5    =02BA  2    =02D9
```

```
FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 ALATI   ALONG   FCOS    FSIN    FPLOT   FCHAR   FADDX   FSUB    FSUBX   FMPY    FDIV    FLD     FLDX    FSTO    FSTOX
 FSBR    FDVR    IFIX    FLOAT   SWRT    SCOMP   SUBSC   SNR     SUBIN

REAL CONSTANTS
  .200000E 01=00E2    .100000E 02=00E4    .500000E 01=00E6    .100000E 01=00E8    .174532E-01=00EA    .314159E 01=00EC
  .400000E-01=00EE    .800000E-01=00F0

INTEGER CONSTANTS
     1=00F2     10=00F3      2=00F4      7=00F5

CORE REQUIREMENTS FOR CRNT
 COMMON    366  VARIABLES    226  PROGRAM    506

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2018        2018        0000

// FOR
*ONE WORD INTEGERS
*LISTALL
      SUBROUTINE PDIS(JSM,DIST1,DIST2,XLAT1,XLAT2,XLON1,XLON2,XXD,
     1  SLAT,ANLAT,WLONG,ELONG,SCALE,X1,Y1,PI)
      COMMON AM(12),AY(11),B(160)
      XSM=JSM
      JDIS=DIST1/XSM
      DISJ=JDIS*JSM
      IF(DISJ)311,311,314
  314 IF (DISJ-DIST1) 311,312,313
  311 DISJ= DISJ+JSM
      GO TO 314
  313 IF (DISJ-DIST2) 312,315,315
  312 XLATP=XLAT1+(XLAT2-XLAT1)*(DISJ-DIST1)/XXD
      YIP=ALATI(XLATP,SLAT,ANLAT)
      IF(YIP)311,3121,3121
 3121 XLONP=XLON1+(XLON2-XLON1)*(DISJ-DIST1)/XXD
      XIP=ALONG(XLONP,WLONG,ELONG,SCALE)
      IF(XIP)311,3122,3122
 3122 IF(FABS(XIP-X1)-FABS(YIP-Y1))364,364,365
  364 XIP=XIP-0.44
      YIP=YIP-.04
      THETA=0
```

```
      GO TO 316
  365 XIP=XIP+.04
      YIP=YIP-.44
      THETA=PI/2.
  316 JDIS=DISJ/JSM
      CALL FCHAR(XIP,YIP,0.08,0.08,THETA)
      WRITE(7,706)JDIS
  706 FORMAT (I5,1H-)
      DISJ=DISJ+JSM
      GO TO 313
  315 CONTINUE
      RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92   XSM(R )=0000       DISJ(R )=0002      XLATP(R )=0004
   YIP(R )=0006      XLONP(R )=0008        XIP(R )=000A      THETA(R )=000C       JDIS(I )=0014

STATEMENT ALLOCATIONS
 706  =0020  314  =006A  311  =0073  313  =007C  312  =0083  3121 =00A1  3122 =00C0  364  =00D9  365  =00EC  316  =00FE
 315  =011C

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 ALATI   ALONG   FABS    FCHAR   FSUB    FMPY    FDIV    FLD     FSTO    FSBR    FDVR    IFIX    FLOAT   SWRT    SCOMP
 SIOI    SUBIN

REAL CONSTANTS
  .440000E 00=0016    .400000E-01=0018    .200000E 01=001A    .800000E-01=001C

INTEGER CONSTANTS
     0=001E      7=001F

CORE REQUIREMENTS FOR PDIS
 COMMON    366  VARIABLES     22  PROGRAM.   264

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2018        2018        0000

// FOR
*LISTALL
*ONE WORD INTEGERS
      SUBROUTINE          PTIM(AA2,HR2,TT1,XLAT1,XLAT2,TT2,SLAT,ANLAT,
     1 XLON1,XLON2,WLONG,ELONG,SCALE,JBLUE)
      COMMON AM(12),AY(11),B(160)
      JPT=0
      INDEX=2
      DELT=1.
      Y1=ALATI(XLAT1,SLAT,ANLAT)
      X1=ALONG(XLON1,WLONG,ELONG,SCALE)
      Y2=ALATI(XLAT2,SLAT,ANLAT)
      X2=ALONG(XLON2,WLONG,ELONG,SCALE)
      IF(Y1)21,22,22
   22 IF(X1)21,23,23
   21 INDEX=1
   23 IF(Y2)25,24,24
   24 IF(X2)25,318,318
   25 GO TO (327,317),INDEX
  317 INDEX=1
  318 XTIM=AA2+HR2
  321 IF(Y1)320,319,319
  319 IF(X1)320,316,316
  316 CALL FPLOT(1,X1,Y1)
  320 IF(XTIM-TT1)325,325,322
  322 XLATP=XLAT1+(XLAT2-XLAT1)*(XTIM-TT1)/(TT2-TT1)
      YIP=ALATI(XLATP,SLAT,ANLAT)
      IF(YIP)17,3221,3221
 3221 XLONP=XLON1+(XLON2-XLON1)*(XTIM-TT1)/(TT2-TT1)
      XIP=ALONG(XLONP,WLONG,ELONG,SCALE)
      IF(XIP)17,3222,3222
 3222 CALL FPLOT(-2,XIP,YIP)
      IF(JBLUE)17,18,17
   18 CALL POINT(JPT)
      IF(JPT)17,202,17
  202 CALL FPLOT(-1,XIP,YIP)
   17 XTIM=XTIM-DELT
      GO TO 320
  325 GO TO(326,327),INDEX
  326 DELT=.05
      JPT=6
      XTIM=TT2
      INDEX=2
      GO TO 321
  327 RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2    B(RC)=7FD0-7E92  DELT(R )=0000        Y1(R )=0002        X1(R )=0004
```

```
    Y2(R )=0006          X2(R )=0008        XTIM(R )=000A       XLATP(R )=000C         YIP(R )=000E       XLONP(R )=0010
   XIP(R )=0012         JPT(I )=0018       INDEX(I )=0019

STATEMENT ALLOCATIONS
 22    =0086  21    =008B  23    =008F  24    =0094  25    =0099  317   =009F  318   =00A3  321   =00A9  319   =00AE  316   =00B3
 320   =00B8  322   =00BF  3221  =00E3  3222  =0108  18    =0116  202   =011D  17    =0127  325   =012F  326   =0135  327   =0147

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 ALATI    ALONG    FPLOT    POINT    FSUB     FMPY     FLD      FSTO     FDVR     SUBIN

REAL CONSTANTS
  .100000E 01=001A     .500000E-01=001C

INTEGER CONSTANTS
     0=001E       2=001F       1=0020       6=0021

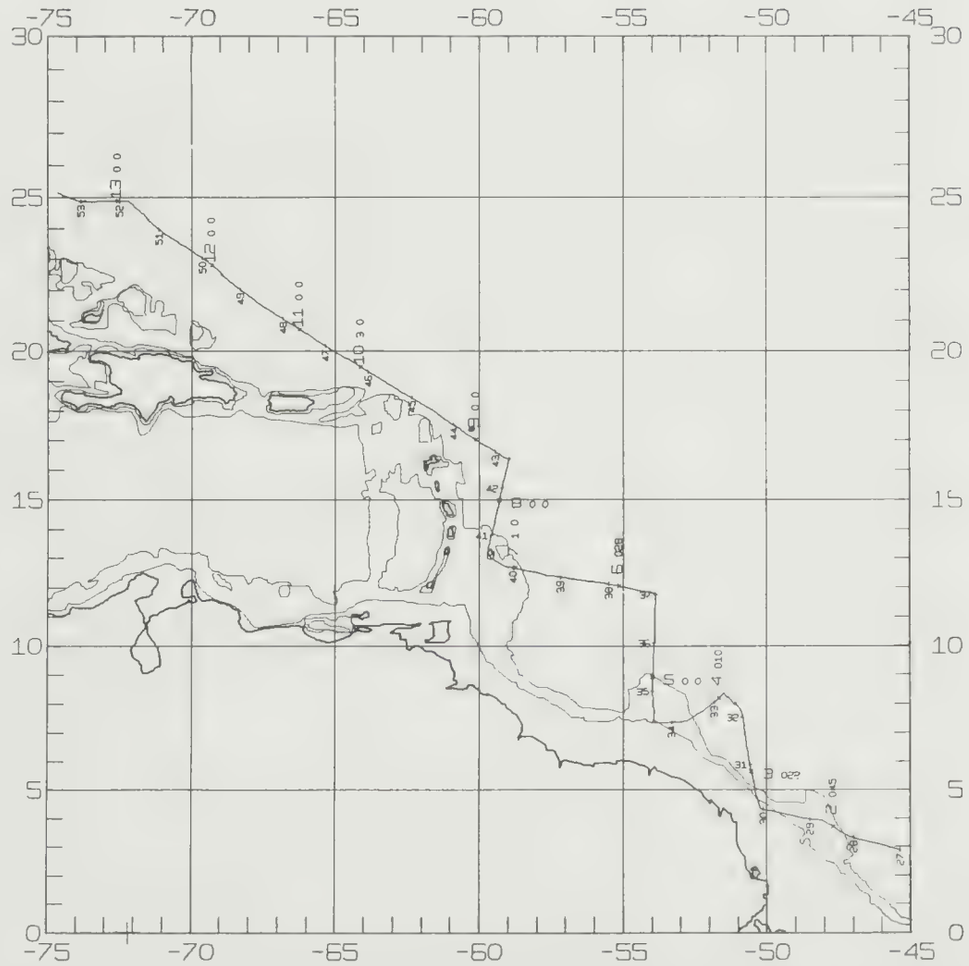
CORE REQUIREMENTS FOR PTIM
 COMMON     366  VARIABLES      26  PROGRAM     304

 END OF COMPILATION
```

```
// JOB
// XEQ MERN2     1
*FILES(1,B2413),(3,A2413)
      -75.       -45.        0.        30.      .3574     2     0     5     1
    1     1  100     0     0     1     0     0     0
```

CONTROL CARDS AND INPUT

OUTPUT

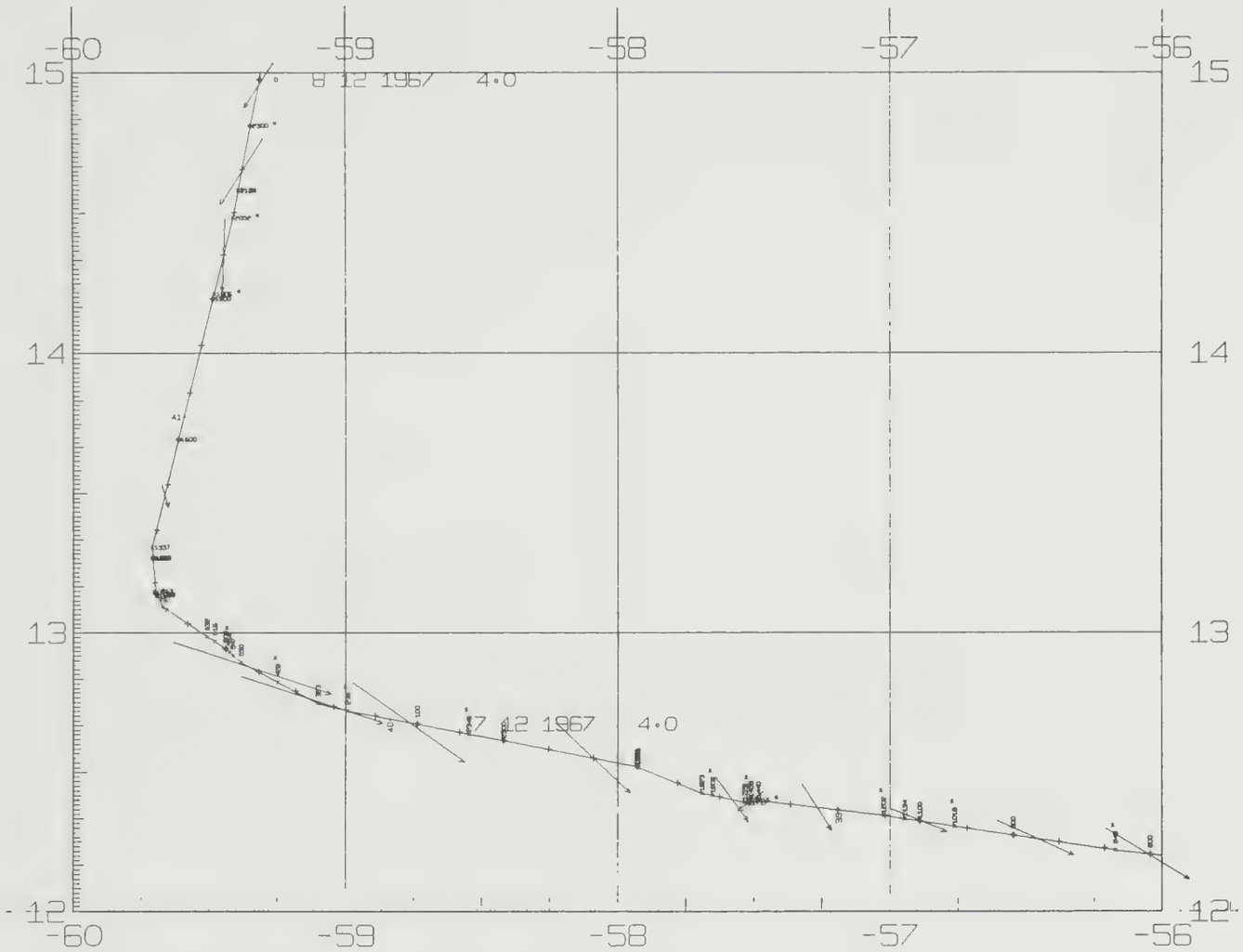


Contours have been drawn by DIGM3 program which is not given in this report.

```
// JOB
// XEQ MERN2     1
*FILES(1,B2413),(3,A2413)
      -60.       -56.        12.        15.        4.     1     1     1     1
    1     0   100     1     0     1     1     0     0
```

CONTROL CARDS AND INPUT

OUTPUT



```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2007        2007        0000

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*LISTALL
*ONE WORD INTEGERS
C NVANS
C GIVEN NAVIGATION DATA ON DISK THIS PROGRAM PRINTS NAVIGATION ANSWERS.
C ONLY DATA CARD NEEDED IS ONE IN WHICH CRUISE I.D. ETC. ARE PUNCHED IN
C FIRST 76 COLUMNS OF THE CARD.
C COLUMN 80 (JS1) IS ZERO IF REGIONAL MAGNETICS IS TO BE PRINTED OUT.
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3(1,10,U,INXT)
      DIMENSION AM(12),AY(11)
      COMMON AM,AY
      CALL AMAY
      KK=0
      J=0
      JJ=0
      XXN=0.0
      JJDY=0
      JJYR=0
      II=0
      XXE=0.0
      JJMON=0
      NNL=0
      XXD=0.0
      JJH=0
      XXL=0.0
      XXD=0.0
      JJMIN=0
      READ(8,200)A,B,C,D,E,F,G,H,HH,HHH,BB,CC,DD,EE,FF,GG,AAA,BBB,CCC,JS
     11
  200 FORMAT(19A4,I4)
  102 JJ=JJ+1
      WRITE(5,100)A,B,C,D,E,F,G,H,HH,HHH,JJ
  100 FORMAT(1H1,10A4,22X,4HPAGE,I3)
      IF(JS1)906,907,906
  906 WRITE(5,201)
  201 FORMAT(//1H ,3HDAY,1X,3HMON,1X,4HYEAR,2X,2HTZ,2X,4HTIME,2X,8HLATIT
     1UDE,1X,9HLONGITUDE,2X,8HDISTANCE,1X,5HSPEED,1X,6HCOURSE,/)
      GO TO 908
  907 WRITE(5,202)
  202 FORMAT(//1H ,3HDAY,1X,3HMON,1X,4HYEAR,2X,2HTZ,2X,4HTIME,2X,8HLATIT
     1UDE,1X,9HLONGITUDE,2X,8HDISTANCE,1X,5HSPEED,1X,6HCOURSE,1X,12HREGI
     2ONAL MAG,/)
  908 J=0
      IF(KK)103,104,103
```

```
 104 KK=KK+1
     READ(3'1)DISTA,I,DMAX,CRUIS,JBSYR
     IF(JBSYR-1959)7001,7002,7002
7002 IF(JBSYR-1970)7003,7003,7001
7001 JBSYR=1959
7003 CONTINUE
     II=II+1
     READ(1'II)TT1,XLAT1,XLON1,SETE,TZ1,IRES
     RES1=IRES
     RES1=RES1+50000.
 303 II=II+1
     READ(1'II)TT2,XLAT2,XLON2,SETE,TZ2,IRES
     RES2=IRES
     RES2=RES2+50000.
     CALL COMDI(XLAT1,XLON1,XLAT2,XLON2,XXE,XXN,XXD)
     DISTB=DISTA+XXD
     JCOR1=CATAN(XXN,XXE)+.5
     SPD1=(XXD/(TT2-TT1))+.05
 305 CALL DXX(TT1,TZ1,JJDY,JJMON,JJYR,JJH,JJMIN,JBSYR)
     JDAY1=JJDY
     MON1=JJMON
     JYR1=JJYR
     KHR1=JJH
     MIN1=JJMIN
     CALL DEGMI(XLAT1,NNL,XXL)
     LAT1=NNL
     AT1=XXL
     PPON=DELON(XLON1)
     CALL DEGMI(PPON,NNL,XXL)
     LONG1=NNL
     ONG1=XXL
     IF(II-I)306,306,307
 306 DISAA=DISTA+.05
     IF(JS1)900,901,900
 900 WRITE(5,702)JDAY1,MON1,JYR1,TZ1,KHR1,MIN1,LAT1,AT1,LONG1,ONG1,DISA
    1A,SPD1,JCOR1
     GO TO 902
 702 FORMAT(1H ,I3,1X,I3,I5,F5.1,I3,I2,I4,F5.1,I5,F5.1,F10.1,F6.1,I6,2X
    1,F10.0)
     GO TO 902
 901 WRITE(5,702)JDAY1,MON1,JYR1,TZ1,KHR1,MIN1,LAT1,AT1,LONG1,ONG1,DISA
    1A,SPD1,JCOR1,RES1
 902 J=J+1
     IF(J-50)103,102,103
 103 TT1=TT2
     TZ1=TZ2
     XLAT1=XLAT2
     XLON1=XLON2
     DISTA=DISTB
     RES1=RES2
     IF(II-I)303,309,66
```

```
  309 II=II+5
      GO TO 305
  307 DISTC=DISTB+.05
      IF(JS1)903,904,903
  903 WRITE(5,203)JDAY1,MON1,JYR1,TZ1,KHR1,MIN1,LAT1,AT1,LONG1,ONG1,DISTB
     1C
      GO TO 66
  203 FORMAT(1H ,I3,1X,I3,I5,F5.1,I3,I2,I4,F5.1,I5,F5.1,F10.1,14X,F10.0)
  904 WRITE(5,203)JDAY1,MON1,JYR1,TZ1,KHR1,MIN1,LAT1,AT1,LONG1,ONG1,DIST
     1C,RES1
   66 CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2   XXN(R )=000E        XXE(R )=0010        XXD(R )=0012        XXL(R )=0014
     A(R )=0016          B(R )=0018          C(R )=001A          D(R )=001C          E(R )=001E          F(R )=0020
     G(R )=0022          H(R )=0024         HH(R )=0026        HHH(R )=0028         BB(R )=002A         CC(R )=002C
    DD(R )=002E         EE(R )=0030         FF(R )=0032         GG(R )=0034        AAA(R )=0036        BBB(R )=0038
   CCC(R )=003A      DISTA(R )=003C       DMAX(R )=003E      CRUIS(R )=0040        TT1(R )=0042      XLAT1(R )=0044
 XLON1(R )=0046       SETE(R )=0048        TZ1(R )=004A       RES1(R )=004C        TT2(R )=004E      XLAT2(R )=0050
 XLON2(R )=0052        TZ2(R )=0054       RES2(R )=0056      DISTB(R )=0058       SPD1(R )=005A        AT1(R )=005C
  PPON(R )=005E       ONG1(R )=0060      DISAA(R )=0062      DISTC(R )=0064       INXT(I )=0066         KK(I )=0067
     J(I )=0068         JJ(I )=0069       JJDY(I )=006A       JJYR(I )=006B         II(I )=006C      JJMON(I )=006D
   NNL(I )=006E        JJH(I )=006F      JJMIN(I )=0070        JS1(I )=0071          I(I )=0072      JBSYR(I )=0073
  IRES(I )=0074      JCOR1(I )=0075      JDAY1(I )=0076       MON1(I )=0077       JYR1(I )=0078       KHR1(I )=0079
  MIN1(I )=007A       LAT1(I )=007B      LONG1(I )=007C

STATEMENT ALLOCATIONS
 200  =008E  100  =0092  201  =009C  202  =00D1  702  =010E  203  =0121  102  =01B4  906  =01D8  907  =01DE  908  =01E2
 104  =01EA  7002 =0203  7001 =0209  7003 =020D  303  =022D  305  =026F  306  =02B2  900  =02BC  901  =02DE  902  =02FE
 103  =030A  309  =032A  307  =0332  903  =033C  904  =0358  66   =0374

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    COMDI   CATAN   DXX     DEGMI   DELON   FSUB    FLD     FSTO    FDVR    IFIX    FLOAT   TYPEZ   WCHRI   READZ
 SRED    SWRT    SCOMP   SFIO    SIOF    SIOI    PRNZ    SDFIO   SDRED   SDF     SDI

REAL CONSTANTS
  .000000E 00=007E    .500000E 05=0080    .500000E 00=0082    .500000E-01=0084

INTEGER CONSTANTS
     0=0086      8=0087      1=0088      5=0089      3=008A   1959=008B   1970=008C     50=008D

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    126  PROGRAM    760

 END OF COMPILATION
```

```
// JOB
// XEQ NVANS    1
*FILES(1,B2413),(3,A2413)
 VEMA 24 RIO DE JANEIRO - MIAMI                                          1
```

CONTROL CARDS AND INPUT

Only the first and last pages of NVANS output are given here.

VEMA 24 RIO DE JANEIRO - MIAMI PAGE 1

OUTPUT

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
17	11	1967	2.0	1030	-23 0.9	-43 6.9	0.0	7.2	174
17	11	1967	2.0	1031	-23 1.0	-43 6.9	0.1	7.6	119
17	11	1967	2.0	12 0	-23 6.4	-42 56.0	11.5	7.6	95
17	11	1967	2.0	1230	-23 6.7	-42 51.9	15.2	3.1	101
17	11	1967	2.0	1248	-23 6.9	-42 50.9	16.2	7.6	95
17	11	1967	2.0	1428	-23 7.9	-42 37.3	28.8	3.8	99
17	11	1967	2.0	1514	-23 8.4	-42 34.2	31.7	4.2	92
17	11	1967	2.0	1556	-23 8.5	-42 31.0	34.6	8.0	91
17	11	1967	2.0	19 0	-23 9.1	-42 4.4	59.1	8.2	91
17	11	1967	2.0	2032	-23 9.3	-41 50.6	71.7	9.0	96
17	11	1967	2.0	22 0	-23 10.6	-41 36.4	84.9	9.0	96
18	11	1967	2.0	0 0	-23 12.4	-41 17.0	102.8	9.0	96
18	11	1967	2.0	230	-23 14.6	-40 52.5	125.4	3.8	104
18	11	1967	2.0	4 0	-23 16.0	-40 46.6	131.0	6.9	97
18	11	1967	2.0	424	-23 16.3	-40 43.6	133.8	7.3	93
18	11	1967	2.0	7 0	-23 17.5	-40 22.9	152.8	7.9	93
18	11	1967	2.0	750	-23 17.8	-40 15.8	159.4	8.0	97
18	11	1967	2.0	1051	-23 20.6	-39 49.8	183.4	4.2	102
18	11	1967	2.0	11 4	-23 20.8	-39 48.8	184.3	8.0	96
18	11	1967	2.0	14 0	-23 23.4	-39 23.4	207.8	8.2	96
18	11	1967	2.0	1426	-23 23.8	-39 19.5	211.3	8.2	96
18	11	1967	2.0	16 0	-23 25.2	-39 5.6	224.2	7.4	77
18	11	1967	2.0	1724	-23 22.8	-38 54.6	234.6	7.6	76
18	11	1967	2.0	19 0	-23 19.8	-38 41.7	246.8	7.7	76
18	11	1967	2.0	1912	-23 19.4	-38 40.1	248.3	7.6	73
18	11	1967	2.0	2130	-23 14.3	-38 22.0	265.8	7.7	73
18	11	1967	2.0	2358	-23 8.7	-38 2.1	284.9	7.7	73
19	11	1967	2.0	0 0	-23 8.6	-38 1.8	285.1	7.3	73
19	11	1967	2.0	144	-23 5.0	-37 48.6	297.8	7.2	73
19	11	1967	2.0	3 0	-23 2.3	-37 39.1	307.0	6.7	74
19	11	1967	2.0	510	-22 58.2	-37 23.9	321.6	6.8	76
19	11	1967	2.0	6 0	-22 56.8	-37 17.9	327.3	6.8	76
19	11	1967	2.0	658	-22 55.2	-37 10.9	333.9	6.5	80
19	11	1967	2.0	8 0	-22 54.1	-37 3.7	340.6	7.8	100
19	11	1967	2.0	842	-22 55.0	-36 57.8	346.1	7.7	98
19	11	1967	2.0	1014	-22 56.7	-36 45.1	357.9	3.9	107
19	11	1967	2.0	1039	-22 57.2	-36 43.5	359.5	1.2	199
19	11	1967	2.0	1154	-22 58.6	-36 44.0	361.0	1.0	169
19	11	1967	2.0	1336	-23 0.3	-36 43.6	362.8	1.0	179
19	11	1967	2.0	1345	-23 0.5	-36 43.6	362.9	3.5	86
19	11	1967	2.0	14 8	-23 0.4	-36 42.2	364.2	7.7	77

19	11	1967	2.0	18 0	-22	53.9	-36	10.8	393.8	2.8	90
19	11	1967	2.0	18 2	-22	53.9	-36	10.7	393.9	8.1	77
19	11	1967	2.0	1818	-22	53.4	-36	8.4	396.1	8.3	76
19	11	1967	2.0	22 0	-22	46.1	-35	36.2	426.7	7.9	76
19	11	1967	2.0	2224	-22	45.3	-35	32.8	429.9	8.0	77
19	11	1967	2.0	2312	-22	43.8	-35	26.1	436.3	7.9	70
20	11	1967	2.0	0 0	-22	41.6	-35	19.7	442.5	8.0	70
20	11	1967	2.0	058	-22	38.9	-35	11.9	450.3	7.9	73
20	11	1967	2.0	3 0	-22	34.1	-34	55.2	466.4	8.0	73

VEMA 24 RIO DE JANEIRO - MIAMI

DAY	MON	YEAR	TZ	TIME	LATITUDE		LONGITUDE		DISTANCE	SPEED	COURSE
14	12	1967	5.0	3 0	25	25.3	-75	38.7	5403.4	9.8	289
14	12	1967	5.0	4 8	25	28.9	-75	50.3	5414.4	10.3	288
14	12	1967	5.0	520	25	32.7	-76	3.4	5426.8	10.4	277
14	12	1967	5.0	550	25	33.3	-76	9.1	5432.0	10.5	280
14	12	1967	5.0	754	25	37.1	-76	32.9	5453.8	10.6	279
14	12	1967	5.0	8 0	25	37.3	-76	34.0	5454.8	10.6	279
14	12	1967	5.0	952	25	40.5	-76	55.7	5474.6	10.6	278
14	12	1967	5.0	1046	25	41.8	-77	6.2	5484.2	10.5	286
14	12	1967	5.0	1140	25	44.5	-77	16.2	5493.6	10.6	287
14	12	1967	5.0	14 8	25	52.2	-77	44.1	5519.9	10.0	286
14	12	1967	5.0	1444	25	53.9	-77	50.5	5525.8	10.1	280
14	12	1967	5.0	17 0	25	57.7	-78	15.5	5548.7	10.0	280
14	12	1967	5.0	1724	25	58.4	-78	19.9	5552.7	10.4	281
14	12	1967	5.0	1914	26	1.9	-78	40.7	5571.7	10.3	285
14	12	1967	5.0	2019	26	4.8	-78	52.7	5582.8	10.6	298
14	12	1967	5.0	2030	26	5.7	-78	54.6	5584.8	10.4	285
14	12	1967	5.0	2133	26	8.5	-79	6.3	5595.7	10.1	261
14	12	1967	5.0	2332	26	5.2	-79	28.4	5615.8	10.3	282
15	12	1967	5.0	0 0	26	6.2	-79	33.7	5620.6	10.3	282
15	12	1967	5.0	223	26	11.5	-80	0.4	5645.2	7.0	177
15	12	1967	5.0	314	26	5.6	-80	0.0	5651.1	5.4	197
15	12	1967	5.0	4 0	26	1.6	-80	1.4	5655.3	2.0	279
15	12	1967	5.0	425	26	1.7	-80	2.3	5656.2	6.0	210
15	12	1967	5.0	5 0	25	58.7	-80	4.3	5659.6	5.7	209
15	12	1967	5.0	5 7	25	58.1	-80	4.6	5660.3	6.8	161
15	12	1967	5.0	548	25	53.7	-80	3.0	5664.9		

```
// JOB
// XEQ NVANS    1
*FILES(1,B2413),(3,A2413)
 VEMA 24 RIO DE JANEIRO - MIAMI                                          0
```

CONTROL CARDS AND INPUT

Only the first and last pages of NVANS output are given here.

VEMA 24 RIO DE JANEIRO - MIAMI PAGE 1

OUTPUT

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE	REGIONAL MAG
17	11	1967	2.0	1030	-23 0.9	-43 6.9	0.0	7.2	174	24078.
17	11	1967	2.0	1031	-23 1.0	-43 6.9	0.1	7.6	119	24077.
17	11	1967	2.0	12 0	-23 6.4	-42 56.0	11.5	7.6	95	24082.
17	11	1967	2.0	1230	-23 6.7	-42 51.9	15.2	3.1	101	24085.
17	11	1967	2.0	1248	-23 6.9	-42 50.9	16.2	7.6	95	24086.
17	11	1967	2.0	1428	-23 7.9	-42 37.3	28.8	3.8	99	24096.
17	11	1967	2.0	1514	-23 8.4	-42 34.2	31.7	4.2	92	24098.
17	11	1967	2.0	1556	-23 8.5	-42 31.0	34.6	8.0	91	24101.
17	11	1967	2.0	19 0	-23 9.1	-42 4.4	59.1	8.2	91	24124.
17	11	1967	2.0	2032	-23 9.3	-41 50.6	71.7	9.0	96	24136.
17	11	1967	2.0	22 0	-23 10.6	-41 36.4	84.9	9.0	96	24148.
18	11	1967	2.0	0 0	-23 12.4	-41 17.0	102.8	9.0	96	24165.
18	11	1967	2.0	230	-23 14.6	-40 52.5	125.4	3.8	104	24188.
18	11	1967	2.0	4 0	-23 16.0	-40 46.6	131.0	6.9	97	24193.
18	11	1967	2.0	424	-23 16.3	-40 43.6	133.8	7.3	93	24196.
18	11	1967	2.0	7 0	-23 17.5	-40 22.9	152.8	7.9	93	24217.
18	11	1967	2.0	750	-23 17.8	-40 15.8	159.4	8.0	97	24224.
18	11	1967	2.0	1051	-23 20.6	-39 49.8	183.4	4.2	102	24251.
18	11	1967	2.0	11 4	-23 20.8	-39 48.8	184.3	8.0	96	24252.
18	11	1967	2.0	14 0	-23 23.4	-39 23.4	207.8	8.2	96	24280.
18	11	1967	2.0	1426	-23 23.8	-39 19.5	211.3	8.2	96	24284.
18	11	1967	2.0	16 0	-23 25.2	-39 5.6	224.2	7.4	77	24300.
18	11	1967	2.0	1724	-23 22.8	-38 54.6	234.6	7.6	76	24314.
18	11	1967	2.0	19 0	-23 19.8	-38 41.7	246.8	7.7	76	24331.
18	11	1967	2.0	1912	-23 19.4	-38 40.1	248.3	7.6	73	24333.
18	11	1967	2.0	2130	-23 14.3	-38 22.0	265.8	7.7	73	24358.
18	11	1967	2.0	2358	-23 8.7	-38 2.1	284.9	7.7	73	24386.
19	11	1967	2.0	0 0	-23 8.6	-38 1.8	285.1	7.3	73	24386.
19	11	1967	2.0	144	-23 5.0	-37 48.6	297.8	7.2	73	24405.
19	11	1967	2.0	3 0	-23 2.3	-37 39.1	307.0	6.7	74	24419.
19	11	1967	2.0	510	-22 58.2	-37 23.9	321.6	6.8	76	24441.
19	11	1967	2.0	6 0	-22 56.8	-37 17.9	327.3	6.8	76	24450.
19	11	1967	2.0	658	-22 55.2	-37 10.9	333.9	6.5	80	24460.
19	11	1967	2.0	8 0	-22 54.1	-37 3.7	340.6	7.8	100	24470.
19	11	1967	2.0	842	-22 55.0	-36 57.8	346.1	7.7	98	24478.
19	11	1967	2.0	1014	-22 56.7	-36 45.1	357.9	3.9	107	24494.
19	11	1967	2.0	1039	-22 57.2	-36 43.5	359.5	1.2	199	24496.
19	11	1967	2.0	1154	-22 58.6	-36 44.0	361.0	1.0	169	24495.
19	11	1967	2.0	1336	-23 0.3	-36 43.6	362.8	1.0	179	24494.
19	11	1967	2.0	1345	-23 0.5	-36 43.6	362.9	3.5	86	24494.
19	11	1967	2.0	14 8	-23 0.4	-36 42.2	364.2	7.7	77	24496.

CF I was used to obtain regional magnetics.

19	11	1967	2.0	18 0	-22	53.9	-36	10.8	393.8	2.8	90	24543.
19	11	1967	2.0	18 2	-22	53.9	-36	10.7	393.9	8.1	77	24544.
19	11	1967	2.0	1818	-22	53.4	-36	8.4	396.1	8.3	76	24547.
19	11	1967	2.0	22 0	-22	46.1	-35	36.2	426.7	7.9	76	24597.
19	11	1967	2.0	2224	-22	45.3	-35	32.8	429.9	8.0	77	24603.
19	11	1967	2.0	2312	-22	43.8	-35	26.1	436.3	7.9	70	24613.
20	11	1967	2.0	0 0	-22	41.6	-35	19.7	442.5	8.0	70	24624.
20	11	1967	2.0	058	-22	38.9	-35	11.9	450.3	7.9	73	24637.
20	11	1967	2.0	3 0	-22	34.1	-34	55.2	466.4	8.0	73	24665.

VEMA 24 RIO DE JANEIRO - MIAMI PAGE 12

DAY	MON	YEAR	TZ	TIME	LATITUDE		LONGITUDE		DISTANCE	SPEED	COURSE	REGIONAL MAG
14	12	1967	5.0	3 0	25	25.3	-75	38.7	5403.4	9.8	289	49154.
14	12	1967	5.0	4 8	25	28.9	-75	50.3	5414.4	10.3	288	49208.
14	12	1967	5.0	520	25	32.7	-76	3.4	5426.8	10.4	277	49267.
14	12	1967	5.0	550	25	33.3	-76	9.1	5432.0	10.5	280	49281.
14	12	1967	5.0	754	25	37.1	-76	32.9	5453.8	10.6	279	49352.
14	12	1967	5.0	8 0	25	37.3	-76	34.0	5454.8	10.6	279	49355.
14	12	1967	5.0	952	25	40.5	-76	55.7	5474.6	10.6	278	49416.
14	12	1967	5.0	1046	25	41.8	-77	6.2	5484.2	10.5	286	49442.
14	12	1967	5.0	1140	25	44.5	-77	16.2	5493.6	10.6	287	49481.
14	12	1967	5.0	14 8	25	52.2	-77	44.1	5519.9	10.0	286	49593.
14	12	1967	5.0	1444	25	53.9	-77	50.5	5525.8	10.1	280	49618.
14	12	1967	5.0	17 0	25	57.7	-78	15.5	5548.7	10.0	280	49682.
14	12	1967	5.0	1724	25	58.4	-78	19.9	5552.7	10.4	281	49693.
14	12	1967	5.0	1914	26	1.9	-78	40.7	5571.7	10.3	285	49748.
14	12	1967	5.0	2019	26	4.8	-78	52.7	5582.8	10.6	298	49789.
14	12	1967	5.0	2030	26	5.7	-78	54.6	5584.8	10.4	285	49800.
14	12	1967	5.0	2133	26	8.5	-79	6.3	5595.7	10.1	261	49838.
14	12	1967	5.0	2332	26	5.2	-79	28.4	5615.8	10.3	282	49818.
15	12	1967	5.0	0 0	26	6.2	-79	33.7	5620.6	10.3	282	49832.
15	12	1967	5.0	223	26	11.5	-80	0.4	5645.2	7.0	177	49905.
15	12	1967	5.0	314	26	5.6	-80	0.0	5651.1	5.4	197	49840.
15	12	1967	5.0	4 0	26	1.6	-80	1.4	5655.3	2.0	279	49797.
15	12	1967	5.0	425	26	1.7	-80	2.3	5656.2	6.0	210	49799.
15	12	1967	5.0	5 0	25	58.7	-80	4.3	5659.6	5.7	209	49767.
15	12	1967	5.0	5 7	25	58.1	-80	4.6	5660.3	6.8	161	49761.
15	12	1967	5.0	548	25	53.7	-80	3.0	5664.9			49712.

```
// JOB
// XEQ NVANS    1
*FILES(1,B2413),(3,A2413)
 VEMA 24 RIO DE JANEIRO - MIAMI                                    0
```

AND INPUT

Only the first and last pages of NVANS output are given here.

VEMA 24 RIO DE JANEIRO - MIAMI PAGE 1

OUTPUT

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE	REGIONAL MAG
17	11	1967	2.0	1030	-23 0.9	-43 6.9	0.0	7.2	174	24030.
17	11	1967	2.0	1031	-23 1.0	-43 6.9	0.1	7.6	119	24030.
17	11	1967	2.0	12 0	-23 6.4	-42 56.0	11.5	7.6	95	24033.
17	11	1967	2.0	1230	-23 6.7	-42 51.9	15.2	3.1	101	24036.
17	11	1967	2.0	1248	-23 6.9	-42 50.9	16.2	7.6	95	24036.
17	11	1967	2.0	1428	-23 7.9	-42 37.3	28.8	3.8	99	24045.
17	11	1967	2.0	1514	-23 8.4	-42 34.2	31.7	4.2	92	24047.
17	11	1967	2.0	1556	-23 8.5	-42 31.0	34.6	8.0	91	24050.
17	11	1967	2.0	19 0	-23 9.1	-42 4.4	59.1	8.2	91	24070.
17	11	1967	2.0	2032	-23 9.3	-41 50.6	71.7	9.0	96	24081.
17	11	1967	2.0	22 0	-23 10.6	-41 36.4	84.9	9.0	96	24092.
18	11	1967	2.0	0 0	-23 12.4	-41 17.0	102.8	9.0	96	24107.
18	11	1967	2.0	230	-23 14.6	-40 52.5	125.4	3.8	104	24128.
18	11	1967	2.0	4 0	-23 16.0	-40 46.6	131.0	6.9	97	24133.
18	11	1967	2.0	424	-23 16.3	-40 43.6	133.8	7.3	93	24135.
18	11	1967	2.0	7 0	-23 17.5	-40 22.9	152.8	7.9	93	24154.
18	11	1967	2.0	750	-23 17.8	-40 15.8	159.4	8.0	97	24161.
18	11	1967	2.0	1051	-23 20.6	-39 49.8	183.4	4.2	102	24186.
18	11	1967	2.0	11 4	-23 20.8	-39 48.8	184.3	8.0	96	24187.
18	11	1967	2.0	14 0	-23 23.4	-39 23.4	207.8	8.2	96	24213.
18	11	1967	2.0	1426	-23 23.8	-39 19.5	211.3	8.2	96	24217.
18	11	1967	2.0	16 0	-23 25.2	-39 5.6	224.2	7.4	77	24231.
18	11	1967	2.0	1724	-23 22.8	-38 54.6	234.6	7.6	76	24246.
18	11	1967	2.0	19 0	-23 19.8	-38 41.7	246.8	7.7	76	24262.
18	11	1967	2.0	1912	-23 19.4	-38 40.1	248.3	7.6	73	24264.
18	11	1967	2.0	2130	-23 14.3	-38 22.0	265.8	7.7	73	24289.
18	11	1967	2.0	2358	-23 8.7	-38 2.1	284.9	7.7	73	24317.
19	11	1967	2.0	0 0	-23 8.6	-38 1.8	285.1	7.3	73	24317.
19	11	1967	2.0	144	-23 5.0	-37 48.6	297.8	7.2	73	24336.
19	11	1967	2.0	3 0	-23 2.3	-37 39.1	307.0	6.7	74	24350.
19	11	1967	2.0	510	-22 58.2	-37 23.9	321.6	6.8	76	24372.
19	11	1967	2.0	6 0	-22 56.8	-37 17.9	327.3	6.8	76	24381.
19	11	1967	2.0	658	-22 55.2	-37 10.9	333.9	6.5	80	24391.
19	11	1967	2.0	8 0	-22 54.1	-37 3.7	340.6	7.8	100	24402.
19	11	1967	2.0	842	-22 55.0	-36 57.8	346.1	7.7	98	24409.
19	11	1967	2.0	1014	-22 56.7	-36 45.1	357.9	3.9	107	24425.
19	11	1967	2.0	1039	-22 57.2	-36 43.5	359.5	1.2	199	24427.
19	11	1967	2.0	1154	-22 58.6	-36 44.0	361.0	1.0	169	24425.
19	11	1967	2.0	1336	-23 0.3	-36 43.6	362.8	1.0	179	24425.
19	11	1967	2.0	1345	-23 0.5	-36 43.6	362.9	3.5	86	24424.
19	11	1967	2.0	14 8	-23 0.4	-36 42.2	364.2	7.7	77	24426.

CF2 was used to obtain regional magnetics.

19	11	1967	2.0	18 0	-22	53.9	-36	10.8	393.8	2.8	90	24474.
19	11	1967	2.0	18 2	-22	53.9	-36	10.7	393.9	8.1	77	24475.
19	11	1967	2.0	1818	-22	53.4	-36	8.4	396.1	8.3	76	24478.
19	11	1967	2.0	22 0	-22	46.1	-35	36.2	426.7	7.9	76	24530.
19	11	1967	2.0	2224	-22	45.3	-35	32.8	429.9	8.0	77	24535.
19	11	1967	2.0	2312	-22	43.8	-35	26.1	436.3	7.9	70	24546.
20	11	1967	2.0	0 0	-22	41.6	-35	19.7	442.5	8.0	70	24557.
20	11	1967	2.0	058	-22	38.9	-35	11.9	450.3	7.9	73	24571.
20	11	1967	2.0	3 0	-22	34.1	-34	55.2	466.4	8.0	73	24600.

VEMA 24 RIO DE JANEIRO - MIAMI PAGE 12

DAY	MON	YEAR	TZ	TIME	LATITUDE		LONGITUDE		DISTANCE	SPEED	COURSE	REGIONAL MAG
14	12	1967	5.0	3 0	25	25.3	-75	38.7	5403.4	9.8	289	48948.
14	12	1967	5.0	4 8	25	28.9	-75	50.3	5414.4	10.3	288	49003.
14	12	1967	5.0	520	25	32.7	-76	3.4	5426.8	10.4	277	49063.
14	12	1967	5.0	550	25	33.3	-76	9.1	5432.0	10.5	280	49078.
14	12	1967	5.0	754	25	37.1	-76	32.9	5453.8	10.6	279	49151.
14	12	1967	5.0	8 0	25	37.3	-76	34.0	5454.8	10.6	279	49155.
14	12	1967	5.0	952	25	40.5	-76	55.7	5474.6	10.6	278	49218.
14	12	1967	5.0	1046	25	41.8	-77	6.2	5484.2	10.5	286	49245.
14	12	1967	5.0	1140	25	44.5	-77	16.2	5493.6	10.6	287	49286.
14	12	1967	5.0	14 8	25	52.2	-77	44.1	5519.9	10.0	286	49401.
14	12	1967	5.0	1444	25	53.9	-77	50.5	5525.8	10.1	280	49426.
14	12	1967	5.0	17 0	25	57.7	-78	15.5	5548.7	10.0	280	49494.
14	12	1967	5.0	1724	25	58.4	-78	19.9	5552.7	10.4	281	49506.
14	12	1967	5.0	1914	26	1.9	-78	40.7	5571.7	10.3	285	49564.
14	12	1967	5.0	2019	26	4.8	-78	52.7	5582.8	10.6	298	49606.
14	12	1967	5.0	2030	26	5.7	-78	54.6	5584.8	10.4	285	49618.
14	12	1967	5.0	2133	26	8.5	-79	6.3	5595.7	10.1	261	49658.
14	12	1967	5.0	2332	26	5.2	-79	28.4	5615.8	10.3	282	49641.
15	12	1967	5.0	0 0	26	6.2	-79	33.7	5620.6	10.3	282	49657.
15	12	1967	5.0	223	26	11.5	-80	0.4	5645.2	7.0	177	49733.
15	12	1967	5.0	314	26	5.6	-80	0.0	5651.1	5.4	197	49669.
15	12	1967	5.0	4 0	26	1.6	-80	1.4	5655.3	2.0	279	49626.
15	12	1967	5.0	425	26	1.7	-80	2.3	5656.2	6.0	210	49628.
15	12	1967	5.0	5 0	25	58.7	-80	4.3	5659.6	5.7	209	49597.
15	12	1967	5.0	5 7	25	58.1	-80	4.6	5660.3	6.8	161	49591.
15	12	1967	5.0	548	25	53.7	-80	3.0	5664.9			49543.

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*ARITHMETIC TRACE
*TRANSFER TRACE
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*ONE WORD INTEGERS
C PLODI
C GIVEN NAVIGATION DATA ON DISK, PLODI MAKES THE DISTANCE AND POSITION
C ANNOTATIONS ON FINAL PLOT CHART BETWEEN DISTANCES XMIN AND XMAX
C NAUTICAL MILES.
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3(1,10,U,INXT)
      IND1=3
      Y1=0.24
      Y2=2.16
      NNL=0
      XXL=0.0
      XXD=0.0
      XXN=0.0
      XXE=0.0
      PIBY2=1.5707963
      READ(8,701)XMIN,XMAX
      NMIN=XMIN/100.
      XMIN2=NMIN*100
      READ(3'1)DIST1,NPTS
      READ(1' 1)TT1,XLAT1,XLON1,DRFT ,TZ
      IF(DIST1-XMIN2)301,302,302
  302 CALL DEGMI(XLAT1,NNL,XXL)
      D1=(DIST1-XMIN2)/20.
      CALL FPLOT(-2,D1,0.0)
      CALL FPLOT(-1,D1,0.2)
      E=D1+0.1
      CALL FCHAR(E,Y1,0.2,0.2,PIBY2)
      WRITE(7,702)NNL,XXL
      CALL DEGMI(XLON1,NNL,XXL)
      CALL FCHAR(E,Y2,0.2,0.2,PIBY2)
      WRITE(7,703)NNL,XXL
      IND1=1
  301 DO 801 L=2,NPTS
      READ(1' L)TT2,XLAT2,XLON2,DRFT ,TZ
      CALL COMDI(XLAT1,XLON1,XLAT2,XLON2,XXE,XXN,XXD)
      DIST2=DIST1+XXD
      IF(DIST2-XMIN2)810,803,803
  803 IF(DIST2-XMAX)813,813,814
  813 D2=(DIST2-XMIN2)/20.
      GO TO (804,805,812),IND1
```

```
812 IND1=1
    YXD=DIST2
    GO TO 808
804 IF(XXD-4.)806,807,807
806 Y1=Y1+4.
    Y2=Y2+4.
    IND1=2
    GO TO 808
807 YXD=DIST2
    IF(XXD-8.)808,809,809
809 SPEED=(XXD/(TT2-TT1))+.05
    JCOUR=CATAN(XXN,XXE)+0.5
    EE=((DIST1+XXD/2.)-XMIN2)/20.+0.1
    CALL FCHAR(EE,0.42,0.3,0.2,PIBY2)
    WRITE(7,704)SPEED,JCOUR
808 CALL DEGMI(XLAT2,NNL,XXL)
    CALL FPLOT(-2,D2,0.0)
    CALL FPLOT(-1,D2,0.2)
    E=D2+0.1
    CALL FCHAR(E,Y1,0.2,0.2,PIBY2)
    WRITE(7,702)NNL,XXL
    CALL DEGMI(XLON2,NNL,XXL)
    CALL FCHAR(E,Y2,0.2,0.2,PIBY2)
    WRITE(7,703)NNL,XXL
    GO TO 810
805 XXD1=DIST2-YXD
    IF(XXD1-4.)906,907,907
907 Y1=Y1-4.
    Y2=Y2-4.
    IND1=1
    IF(XXD1-8.)908,909,909
909 SPEED=(XXD/(TT2-TT1))+.05
    JCOUR=CATAN(XXN,XXE)+0.5
    EE=((YXD+XXD1/2.-XMIN2)/20.)+0.1
    CALL FCHAR(EE,0.42,0.3,0.2,PIBY2)
    WRITE(7,704)SPEED,JCOUR
908 CALL DEGMI(XLAT2,NNL,XXL)
    YXD=DIST2
    CALL FPLOT(-2,D2,0.0)
    CALL FPLOT(-1,D2,0.2)
    E=D2+0.1
    CALL FCHAR(E,Y1,0.2,0.2,PIBY2)
    WRITE(7,702)NNL,XXL
    CALL DEGMI(XLON2,NNL,XXL)
    CALL FCHAR(E,Y2,0.2,0.2,PIBY2)
    WRITE(7,703)NNL,XXL
    GO TO 810
906 CALL FPLOT(-2,D2,0.0)
    CALL FPLOT(-1,D2,0.2)
810 DIST1=DIST2
    TT1=TT2
```

```
      XLAT1=XLAT2
      XLON1=XLON2
  801 CONTINUE
      XMAX=DIST2
  814 NMAX=XMAX/100.
      YMAX=NMAX*100
      IF(XMAX-YMAX)815,815,816
  816 NMAX=NMAX+1
  815 NMIN=XMIN/100.
      LL=NMAX-NMIN+1
      DO 901 L=1,LL
      LM=(NMIN+LL-L)
      XM=LM
      XXM=(XM*100.-XMIN2)/20.
      CALL FPLOT(-2,XXM,-0.2)
      CALL FPLOT(-1,XXM,0.0)
      AXM=XM/2.
      LAXM=AXM
      ALAXM=LAXM
      IF(AXM-ALAXM)901,502,901
  502 LM=LM*100
      XXM=XXM-1.25
      CALL FCHAR(XXM,-0.25,0.20,0.20,0.0)
      WRITE(7,705)LM
  901 CONTINUE
      CALL EXIT
  701 FORMAT(2F10.1)
  702 FORMAT(I3,F5.1)
  703 FORMAT(I4,F5.1)
  704 FORMAT(F5.1,I5)
  705 FORMAT(I6)
      END
VARIABLE ALLOCATIONS
    Y1(R )=000E        Y2(R )=0010        XXL(R )=0012        XXD(R )=0014        XXN(R )=0016        XXE(R )=0018
 PIBY2(R )=001A      XMIN(R )=001C      XMAX(R )=001E      XMIN2(R )=0020     DIST1(R )=0022       TT1(R )=0024
 XLAT1(R )=0026     XLON1(R )=0028      DRFT(R )=002A         TZ(R )=002C         D1(R )=002E         E(R )=0030
   TT2(R )=0032     XLAT2(R )=0034     XLON2(R )=0036     DIST2(R )=0038         D2(R )=003A       YXD(R )=003C
 SPEED(R )=003E        EE(R )=0040      XXD1(R )=0042      YMAX(R )=0044         XM(R )=0046       XXM(R )=0048
   AXM(R )=004A     ALAXM(R )=004C      INXT(I )=0052      IND1(I )=0053       NNL(I )=0054      NMIN(I )=0055
  NPTS(I )=0056         L(I )=0057     JCOUR(I )=0058      NMAX(I )=0059         LL(I )=005A        LM(I )=005B
  LAXM(I )=005C

STATEMENT ALLOCATIONS
 701  =0087  702  =008A  703  =008D  704  =0090  705  =0093  302  =0103  301  =0151  803  =0178  813  =017F  812  =018D
 804  =0197  806  =019E  807  =01B0  809  =01BB  808  =01EB  805  =022F  907  =023C  909  =0253  908  =0283  906  =02CB
 810  =02DF  801  =02EF  814  =02FC  816  =0312  815  =0318  502  =0372  901  =0391

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
```

```
 IOCS

CALLED SUBPROGRAMS
 DEGMI   FPLOT   FCHAR   COMDI   CATAN   FSUB    FMPY    FDIV    FLD     FSTO    FDVR    SFAR    SIAR    IFIX    FLOAT
 TYPEZ   SFIF    SGOTO   CARDZ   WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOF    SIOI    PRNZ    SNR     SDFIO
 SDRED   SDF     SDI

REAL CONSTANTS
  .240000E 00=005E    .216000E 01=0060    .000000E 00=0062    .157079E 01=0064    .100000E 03=0066    .200000E 02=0068
  .200000E 00=006A    .100000E 00=006C    .400000E 01=006E    .800000E 01=0070    .500000E-01=0072    .500000E 00=0074
  .200000E 01=0076    .420000E 00=0078    .300000E 00=007A    .125000E 01=007C    .250000E 00=007E

INTEGER CONSTANTS
     3=0080      0=0081      8=0082    100=0083      1=0084      2=0085      7=0086

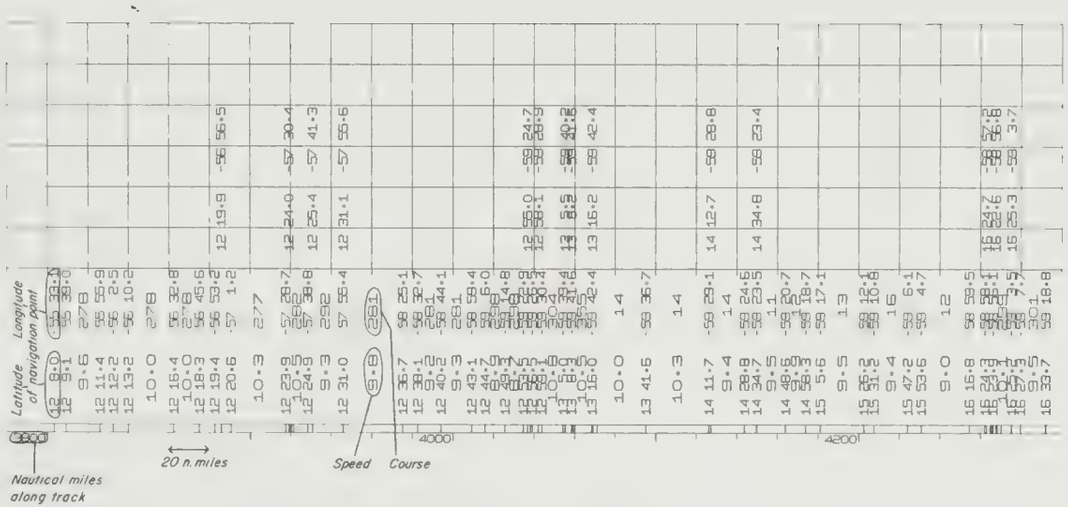
CORE REQUIREMENTS FOR
 COMMON      0  VARIABLES     94  PROGRAM    830

 END OF COMPILATION
```

```
// JOB
// XEQ PLODI     1
*FILES(1,B2413),(3,A2413)
     3800.      4300.
```

CONTROL CARDS AND INPUT

OUTPUT



```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*TRANSFER TRACE
*ARITHMETIC TRACE
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*ONE WORD INTEGERS
C PLTIM
C ADDITIONAL SUBROUTINE CLNG
C GIVEN NAVIGATION DATA ON DISK, PLTIM MAKES THE TIME ANNOTATIONS ON
C FINAL PLOT CHART BETWEEN DISTANCES XMIN AND XMAX NAUTICAL MILES.
C ALSO INDICATES WHERE EACH DEGREE OF LATITUDE OR LONGITUDE IS CROSSED.
      DEFINE FILE 3(1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DIMENSION AM(12),AY(11)
      COMMON AM,AY
      WRITE(1,700)
      PAUSE
      READ(8,5701)XMIN,XMAX
      JMIN=1.+XMIN/600.
      JMAX=1.+XMAX/600.
      XJ=JMIN
      YJ=JMAX
      CALL AMAY
      JDAY1=0
      LS=2
      MON1=0
      JYR1=0
      KHR1=0
      MIN1=0
      JDAY2=0
      MON2=0
      JYR2=0
      KHR2=0
      MIN2=0
      XXE=0.0
      XXN=0.0
      XXD=0.0
      READ(3'1)DISTZ,LQ,DISTA,CRUIS,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      READ(1'1)TT1,PLAT1,PLNG1,SETE,TZ1
      CALL DXX(TT1,TZ1,JDAY1,MON1,JYR1,KHR1,MIN1,JBSYR)
      HR=KHR1
      PIN=MIN1
```

```
      AA1=TT1-HR-PIN/60.
      DIST1=DISTZ
 2181 IF(LQ-LS)392,201,201
  201 READ(1'LS)TT2,PLAT2,PLNG2,SETE,TZ2
      CALL DXX(TT2,TZ2,JDAY2,MON2,JYR2,KHR2,MIN2,JBSYR)
      HR=KHR2
      PIN=MIN2
      AA2=TT2-HR-PIN/60.
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DIST2=DIST1+XXD
      SPEED=XXD/(TT2-TT1)
      LS=LS+1
      DELW=PLNG2  -PLNG1
      IF(DELW)2191,2192,2193
 2191 IF(180.+DELW)2194,2194,2192
 2194 DELW=360.+DELW
      GO TO 2192
 2193 IF(DELW-180.)2192,2195,2195
 2195 DELW=DELW-360.
 2192 DELG=DELW
  391 IF(DIST2  -XMIN)393,5000,5000
 5000 IF(DIST2  -XMAX)5003,5003,392
 5003 DISH=DIST2  -(XJ-1.)*600.
      IF(DISH-600.)5001,5001,5002
 5002 CALL FPLOT(1,30.,0.0)
      IF(XJ-YJ)5005,392,392
 5005 XJ=XJ+1.
      CALL SCALF(1.,1.,0.0,0.0)
      GO TO 391
 5001 IF(KHR2-KHR1)5006,4997,5006
 4997 IF(JDAY2-JDAY1)5006,4998,5006
 4998 GO TO 3911
 5006 KHR3=KHR1
 5007 IF(KHR3-23)5008,5011,5017
 5008 KHR3=KHR3+1
      HRX=KHR3
      TTX=AA1+HRX
      DISTX=DIST1+SPEED*(TTX-TT1-.001)
      IF(DISTX-DIST2  )6002,6002,3911
 6002 DISH=DISTX-(XJ-1.)*600.
      XUX=DISH/20.
      CALL FPLOT(-2,XUX,8.2)
      CALL FPLOT(-1,XUX,8.0)
      KHRX=HRX
      KJRX=KHRX/4
      XUT=KJRX*4
      IF(XUT-HRX)6003,6004,6004
 6004 XUY=XUX-0.4
      CALL FPLOT(-2,XUX,8.2)
      CALL FPLOT(-1,XUX,7.9)
      CALL FCHAR(XUY,7.7,0.2,0.2,0.)
```

```
      WRITE(7,6005)KHRX
 6005 FORMAT(I3)
 6003 IF(HRX-12.)5007,6007,5007
 6007 XUY=XUX-1.8
      CALL FCHAR(XUY,8.3,0.3,0.3,0.)
      WRITE(7,6009)JDAY1,MON1,JYR1
 6009 FORMAT(I3,I3,I5)
 6008 GO TO 5007
 5011 TZX=TZ2-TZ1
      IF(FABS(TZX)-2.)4801,4801,4802
 4801 IF(TZX)5016,5017,5008
 4802 IF(TZX)5008,5017,5016
 5017 HRY=0.0
      IF(KHR2-24)9875,5008,5008
 9875 IF(JDAY1-JDAY2)5025,3911,5025
 5025 TTY=AA2+HRY
      DISTY=DIST1+SPEED*(TTY-TT1)
      IF(DISTY-DIST2  )6011,6011,3911
 6011 DISH=DISTY-(XJ-1.)*600.
      XUX=DISH/20.
      CALL FPLOT(-2,XUX,8.2)
      CALL FPLOT(-1,XUX,8.0)
      KHRY=HRY
      KJRY=KHRY/4
      XUT=KJRY*4
      IF(XUT-HRY)6012,6013,6013
 6013 XUY=XUX-0.4
      CALL FPLOT(-2,XUX,8.2)
      CALL FPLOT(-1,XUX,7.9)
      CALL FCHAR(XUY,7.7,0.2,0.2,0.)
      WRITE(7,6014)KHRY
 6014 FORMAT(I3)
 6012 IF(HRY-12.)5020,8014,5020
 8014 XUY=XUX-1.8
      CALL FCHAR(XUY,8.3,0.3,0.3,0.)
      WRITE(7,6016)JDAY2,MON2,JYR2
 6016 FORMAT(I3,I3,I5)
 6015 GO TO 5020
 5020 HRY=HRY+1.
      GO TO 5025
 5016 HRY=1.
      IF(JDAY1-JDAY2)5025,3911,5025
 3911 X2=PLAT2  +90.
       X1=PLAT1+90.
      JX2=X2
      JX1=X1
      IF(JX1-JX2)3931,3932,3933
 3931 X3=JX1+1
 3934 DISP=DIST1     +XXD*(X3-X1)/(X2-X1)
      IF(DISP-DIST2  )3935,3935,3932
 3935 JX3=X3-90.
```

```
6022 DISH=DISP-(XJ-1.)*600.
     XUX=DISH/20.
     CALL FPLOT(-2,XUX,7.6)
     CALL FPLOT(-1,XUX,7.45)
     XUY=XUX-0.5
     CALL FCHAR(XUY,7.15,0.2,0.2,0.)
     WRITE(7,6024)JX3
6024 FORMAT(I3)
6023 X3=X3+1.
     GO TO 3934
3933 X3=JX1
3937 DISP=DIST1     +XXD*(X3-X1)/(X2-X1)
     IF(DISP-DIST2  )3936,3936,3932
3936 JX3=X3-90.
6026 DISH=DISP-(XJ-1.)*600.
     XUX=DISH/20.
     CALL FPLOT(-2,XUX,7.6)
     CALL FPLOT(-1,XUX,7.45)
     XUY=XUX-0.5
     CALL FCHAR(XUY,7.15,0.2,0.2,0.)
     WRITE(7,6028)JX3
6028 FORMAT(I3)
6027 X3=X3-1.
      GO TO 3937
3932 CALL CLNG(PLNG2)
     CALL CLNG(PLNG1)
     X2=PLNG2+180.
     X1=PLNG1     +180.
     JX2=X2
     JX1=X1
     JX4=JX1-JX2
     IF(IABS(JX4)-180)3941,3942,3942
3941 IF(JX4)3943,3944,3945
3942 IF(JX4)3945,3944,3943
3943 X3=JX1+1
3946 DISP=DIST1     +XXD*(X3-X1)/DELG
     IF(DISP-DIST2  )3947,3947,3944
3947 JX3=X3-180.
     IF(JX3-180)6032,6032,3975
3975 JX3=JX3-360
6032 DISH=DISP-(XJ-1.)*600.
     XUX=DISH/20.
     CALL FPLOT(-2,XUX,7.0)
     CALL FPLOT(-1,XUX,6.85)
     XUY=XUX-0.6
     CALL FCHAR(XUY,6.55,0.2,0.2,0.)
     WRITE(7,6034)JX3
6034 FORMAT(I4)
6033 X3=X3+1.
     GO TO 3946
3945 X3=JX1
```

```
 3948 DISP=DIST1     +XXD*(X3-X1)/DELG
      IF(DISP-DIST2  )3949,3949,3944
 3949 JX3=X3-180.
      IF(JX3+180)3977,6036,6036
 3977 JX3=JX3+360
 6036 DISH =DISP-(XJ-1.)*600.
      XUX=DISH/20.
      CALL FPLOT(-2,XUX,7.0)
      CALL FPLOT(-1,XUX,6.85)
      XUY=XUX-0.6
      CALL FCHAR(XUY,6.55,0.2,0.2,0.)
      WRITE(7,6038)JX3
 6038 FORMAT(I4)
 6037 X3=X3-1.
      GO TO 3948
 3944 GO TO 393
  393 KHR1=KHR2
      MIN1=MIN2
      JDAY1=JDAY2
      MON1=MON2
      JYR1=JYR2
      TZ1=TZ2
      AA1=AA2
      PLAT1=PLAT2
      PLNG1=PLNG2
      TT1=TT2
      DIST1=DIST2
      GO TO 2181
  392 CALL EXIT
  700 FORMAT(59HSET CROSS HAIR AT BEG. OF PROFILE 9 INCHES FROM LEFT MAR
     1GIN/38HMAKE SURE YOU ARE READING IN XMIN XMAX)
  701 FORMAT(2F10.2)
  703 FORMAT(I5,F10.2)
  705 FORMAT(I3,I3,I5)
  702 FORMAT(I2,I2,I4,F5.2,I5,F5.2)
 7011 FORMAT(I2,I3,I5,F8.3,I2)
 7071 FORMAT(F10.3,I5,A4)
 5701 FORMAT(2F10.5)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2  XMIN(R )=000E      XMAX(R )=0010        XJ(R )=0012        YJ(R )=0014
   XXE(R )=0016        XXN(R )=0018       XXD(R )=001A     DISTZ(R )=001C     DISTA(R )=001E     CRUIS(R )=0020
   TT1(R )=0022      PLAT1(R )=0024     PLNG1(R )=0026      SETE(R )=0028       TZ1(R )=002A        HR(R )=002C
   PIN(R )=002E        AA1(R )=0030     DIST1(R )=0032       TT2(R )=0034     PLAT2(R )=0036     PLNG2(R )=0038
   TZ2(R )=003A        AA2(R )=003C     DIST2(R )=003E     SPEED(R )=0040      DELW(R )=0042      DELG(R )=0044
  DISH(R )=0046        HRX(R )=0048       TTX(R )=004A     DISTX(R )=004C       XUX(R )=004E       XUT(R )=0050
   XUY(R )=0052        TZX(R )=0054       HRY(R )=0056       TTY(R )=0058     DISTY(R )=005A        X2(R )=005C
    X1(R )=005E         X3(R )=0060      DISP(R )=0062      INXT(I )=0066      JMIN(I )=0067      JMAX(I )=0068
 JDAY1(I )=0069         LS(I )=006A      MON1(I )=006B      JYR1(I )=006C      KHR1(I )=006D      MIN1(I )=006E
 JDAY2(I )=006F       MON2(I )=0070      JYR2(I )=0071      KHR2(I )=0072      MIN2(I )=0073        LQ(I )=0074
 JBSYR(I )=0075       KHR3(I )=0076      KHRX(I )=0077      KJRX(I )=0078      KHRY(I )=0079      KJRY(I )=007A
```

```
   JX2(I )=007B        JX1(I )=007C        JX3(I )=007D        JX4(I )=007E

UNREFERENCED STATEMENTS
 6008    6015    6022    6023    6026    6027    6033    6037    701     703     705     702     7011    7071

STATEMENT ALLOCATIONS
 6005 =00C8  6009 =00CA  6014 =00CE  6016 =00D0  6024 =00D4  6028 =00D6  6034 =00D8  6038 =00DA  700  =00DC  701  =0111
 703  =0114  705  =0117  702  =011B  7011 =0122  7071 =0128  5701 =012C  7002 =01BF  7001 =01C6  7003 =01CA  2181 =01FD
 201  =0204  2191 =025D  2194 =0264  2193 =026C  2195 =0273  2192 =0279  391  =027D  5000 =0284  5003 =028B  5002 =029C
 5005 =02A8  5001 =02B6  4997 =02BD  4998 =02C4  5006 =02C6  5007 =02CA  5008 =02D3  6002 =02F7  6004 =0336  6003 =035D
 6007 =0364  6008 =037B  5011 =037D  4801 =038B  4802 =0394  5017 =039B  9875 =03A6  5025 =03AD  6011 =03C4  6013 =0403
 6012 =042A  8014 =0431  6015 =0448  5020 =044A  5016 =0452  3911 =045D  3931 =047C  3934 =0483  3935 =049C  6022 =04A3
 6023 =04DA  3933 =04E2  3937 =04E7  3936 =0500  6026 =0507  6027 =053E  3932 =0546  3941 =0570  3942 =0579  3943 =0580
 3946 =0587  3947 =059A  3975 =05A8  6032 =05AE  6033 =05E5  3945 =05ED  3948 =05F2  3949 =0605  3977 =0613  6036 =0619
 6037 =0650  3944 =0658  393  =065A  392  =0688

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    DXX     COMDI   FPLOT   SCALF   FCHAR   FABS    CLNG    IABS    FSUB    FMPY    FDIV    FLD     FSTO    FSBR
 FDVR    SFAR    SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOF
 SIOI    PRNZ    PAUSE   SDFIO   SDRED   SDF     SDI

REAL CONSTANTS
  .100000E 01=0080    .600000E 03=0082    .000000E 00=0084    .600000E 02=0086    .180000E 03=0088    .360000E 03=008A
  .300000E 02=008C    .100000E-02=008E    .200000E 02=0090    .820000E 01=0092    .800000E 01=0094    .400000E 00=0096
  .790000E 01=0098    .770000E 01=009A    .200000E 00=009C    .120000E 02=009E    .180000E 01=00A0    .830000E 01=00A2
  .300000E 00=00A4    .200000E 01=00A6    .900000E 02=00A8    .760000E 01=00AA    .745000E 01=00AC    .500000E 00=00AE
  .715000E 01=00B0    .700000E 01=00B2    .685000E 01=00B4    .600000E 00=00B6    .655000E 01=00B8

INTEGER CONSTANTS
     1=00BA      8=00BB      0=00BC      2=00BD      3=00BE   1959=00BF   1970=00C0     23=00C1      4=00C2      7=00C3
    24=00C4    180=00C5    360=00C6      0=00C7

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    128  PROGRAM   1546

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*LISTALL
*ONE WORD INTEGERS
C CLNG
      SUBROUTINE CLNG(PLNG)
      IF(FABS(PLNG)-180.)1,1,2
    2 IF(PLNG)3,4,4
    3 PLNG=PLNG+360.
      GO TO 1
    4 PLNG=PLNG-360.
    1 RETURN
      END

STATEMENT ALLOCATIONS
 2    =0016  3    =001B  4    =0023  1    =0029

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FABS    FSUB    FLD     FSTO    SUBIN

REAL CONSTANTS
  .180000E 03=0000    .360000E 03=0002

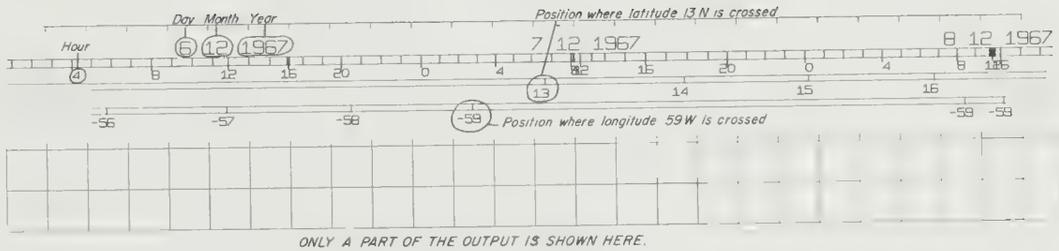
CORE REQUIREMENTS FOR CLNG
 COMMON      0  VARIABLES      0  PROGRAM     44

 END OF COMPILATION
```

```
// JOB
// XEQ PLTIM     1
*FILES(1,B2413),(3,A2413)
     3800.      4300.
```

CONTROL CARDS
AND INPUT

OUTPUT



ONLY A PART OF THE OUTPUT IS SHOWN HERE.

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*ONE WORD INTEGERS
*LISTALL
*ARITHMETICTRACE
*TRANSFERTRACE
C AVFRE
C ADDITIONAL SUBROUTINES AVFR1,AVFR2,DZERO
C THIS PROGRAM AVERAGES FREE AIR GRAVITY DATA
C     DEG IS DEGREE SQUARE USED FOR AVERAGING
C     ALPHA AND IDI ARE CRUISE AND LEG ID
C WLONG, ELONG, SLAT AND ANLAT DEFINE RESPECTIVELY IN DEGREES THE WEST,
C EAST, SOUTH AND NORTH BOUNDARIES OF THE AREA IN WHICH AVERAGING IS
C BEING DONE.
C INPUT DATA CAN BE GRAVITY DATA ON DISK (SET JOT=0), GRAVITY ANSWER
C CARDS (SET JOT NON ZERO, KOT=0) OR PREVIOUSLY AVERAGED GRAVITY VALUES
C ON CARDS (SET JOT NON ZERO, KOT NON ZERO).
C FOR DISK GRAVITY DATA, ISNEL=0 IF DATA CONSISTS OF CHART READINGS,
C ISNEL IS NON ZERO IF DATA ARE FREE AIR ANOMALIES.
C IF NEOT IS NOT ZERO, D.R.EOTVOS HAS BEEN APPLIED TO CHART READINGS.
C WHEN INPUT IS GRAVITY ANSWERS,
C THE DATA READ FROM EACH CARD ARE JDAY, GLAT, GLONG, FA.
C WHEN INPUT IS PREVIOUS AVERAGES THE DATA READ ARE GLAT, GLONG, NK, FA,
C WHICH ARE RESPECTIVELY THE COORDINATES OF THE CENTER OF THE
C AVERAGED SQUARE, THE NUMBER OF POINTS USED IN AVERAGING AND THE
C AVERAGE FREE AIR GRAVITY, MULTIPLIED BY THE NUMBER OF POINTS.
C OTHER DATA ARE IGNORED.
C OUTPUT IS PUNCHED AND PRINTED.
C EACH CARD GIVES GLAT, GLONG (LAT AND LONG OF CENTER OF SQUARE), HF
C (AVERAGE FREE AIR GRAVITY FOR THAT SQUARE), NK, THE NUMBER OF POINTS
C USED IN AVERAGING, AND THE PRODUCT OF HF AND NK.
C ALSO PUNCHED ARE ALPHA AND IDI
      DEFINE FILE 4 (10000,3,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 10(500,15,U,INXT)
      DEFINE FILE 11(1500,18,U,INXT)
      DIMENSION AM(12),AY(11),THR(9),TMIN(9),G(9),JTIM(9),JG(9)
      COMMON AM,AY
      CALL AMAY
      KS=0
      KT=0
      IND1=0
      KB=1
    8 READ(8,702)WLONG,ELONG,SLAT,ANLAT,DEG,ALPHA,IDI,JOT,KOT,NEOT,ISNEL
```

```
      NK=1
      KLAT=0
      KLONG=0
      CALL DZERO(WLONG,ELONG,SLAT,ANLAT,DEG,KLAT,KLONG)
      IF(JOT)63,20,63
   63 IF(KOT)64,62,64
   64 READ(8,712)GLAT,GLONG,NK,FA
  712 FORMAT(2F10.3,10XI5,F10.0)
      CALL AVFR1(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,DEG,NK)
      IF(NK)64,6,64
   62 READ(8,711)JDAY,GLAT,GLONG,FA
  711 FORMAT(I3,8X,F7.3,F8.3,39XF6.1)
      CALL AVFR1(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,DEG,NK)
      IF(GLAT)62,9999,62
 9999 IF(GLONG)62,6,62
   20 READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SET1,TZ
      XXE=0.
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SET2,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      DEN=(PLAT2-PLAT1)/DELT
      DEM=DELON(PLNG2-PLNG1)/DELT
      IF(NEOT)1,2,1
    1 KAZM=SET1/10.
      SET1=(SET1-KAZM*10.)*SIN(KAZM/57.29578)
      EOT=.0075*SET1*FCOS((PLAT1+PLAT2)/114.59156)
      GO TO 3
    2 EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
    3 FOT=1000.*EOT
      GO TO(402,2221),KB
  402 KS=KS+1
      READ(10'KS)JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ,KT
      KB=2
      IF(JDAY)6,6,85
   85 L=0
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
      DIAL=JDIAL
      GZ=GZ+DIAL*CF*.001
      DRR=DRR*CF
  221 KT=KT+1
      READ(11'KT)(JTIM(I),JG(I),I=1,9)
```

```
      DO 2399 I=1,9
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
      J=0
      L=L+1
      IF(L-LB)2216,2217,2217
 2216 LE=9
      GO TO 222
 2217 LE=LC
  222 J=J+1
      TTT=AA+THR(J)+TMIN(J)/60.
 2221 IF(TTT-TNAV2)2251,223,225
 2251 IF(TTT-TNAV1)20,223,223
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
      RLAT=GLAT/57.29578
      FI=978.049*(1.0052825-.0052884*
     1 (FCOS(RLAT)**2)+0.0000059*(FCOS(2.*RLAT)**2))
      IF(ISNEL)631,632,631
  631 IF(G(J)-500.)1000,1001,1001
 1001 G(J)=G(J)-1000.
 1000 FA=G(J)
      GRAV=FI+FA/1000.
      GO TO 634
  632 GRAV=GZ+DRR*G(J)*.001+EOT
      FA=(GRAV-FI)*1000.
  634 LGG=THR(J)*100.+TMIN(J)
      JDM=(JDAY*1000)+MON
      CALL AVFR1(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,DEG,NK)
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,402,402
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      SET1=SET2
      M=M+1
      GO TO 9973
    6 CALL AVFR2(WLONG,SLAT,DEG,KLAT,KLONG,ALPHA,IDI)
  702 FORMAT(5F10.5,A4,I3,3X,3I5,I5)
  706 FORMAT(I3,I3,I5,F7.3,F8.3,F7.1,F8.1,6XF9.4,F9.4,F6.1,A4,F5.1)
  709 FORMAT(I2,I3,I5,F5.0,1X,I2,I2,I5,F6.3,F7.4,F9.4)
  710 FORMAT(9(F2.0,F2.0,F3.0,1X))
      CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2   THR(R )=0034-0024  TMIN(R )=0046-0036     G(R )=0058-0048 WLONG(R )=005A
```

```
 ELONG(R )=005C        SLAT(R )=005E       ANLAT(R )=0060        DEG(R )=0062       ALPHA(R )=0064        GLAT(R )=0066
 GLONG(R )=0068          FA(R )=006A        DISA(R )=006C       DMAX(R )=006E       CRUIS(R )=0070       TNAV1(R )=0072
 PLAT1(R )=0074       PLNG1(R )=0076        SET1(R )=0078         TZ(R )=007A         XXE(R )=007C         XXN(R )=007E
   XXD(R )=0080       TNAV2(R )=0082       PLAT2(R )=0084      PLNG2(R )=0086        SET2(R )=0088       DISB(R )=008A
  DELT(R )=008C       SPEED(R )=008E         DEN(R )=0090        DEM(R )=0092        EOT(R )=0094        FOT(R )=0096
   DRR(R )=0098          CF(R )=009A         GZ(R )=009C         AA(R )=009E       DIAL(R )=00A0        TTT(R )=00A2
  GDIS(R )=00A4       GDISK(R )=00A6        RLAT(R )=00A8         FI(R )=00AA       GRAV(R )=00AC       JTIM(I )=00BA-00B2
    JG(I )=00C3-00BB   INXT(I )=00C4         KS(I )=00C5         KT(I )=00C6       IND1(I )=00C7         KB(I )=00C8
   IDI(I )=00C9         JOT(I )=00CA        KOT(I )=00CB       NEOT(I )=00CC      ISNEL(I )=00CD         NK(I )=00CE
  KLAT(I )=00CF       KLONG(I )=00D0        JDAY(I )=00D1          I(I )=00D2      JBSYR(I )=00D3          M(I )=00D4
  KAZM(I )=00D5         MON(I )=00D6         JYR(I )=00D7         LB(I )=00D8         LC(I )=00D9      JDIAL(I )=00DA
     L(I )=00DB        JJHR(I )=00DC           J(I )=00DD         LE(I )=00DE        LGG(I )=00DF         JDM(I )=00E0

UNREFERENCED STATEMENTS
 18      706     709     710

STATEMENT ALLOCATIONS
 712  =0110  711  =0116  702  =011D  706  =0126  709  =0134  710  =0140  8    =0172  63   =01A5  64   =01AA  62   =01C7
 9999 =01E2  20   =01E9  7002 =01FD  7001 =0204  7003 =0208  9973 =0225  1    =0267  2    =029C  3    =02B3  402  =02BE
 85   =02E6  221  =0308  2399 =0349  2216 =0373  2217 =0379  222  =037D  2221 =0396  2251 =039F  223  =03A6  631  =03F8
 1001 =0404  1000 =040F  632  =0422  634  =043B  18   =045D  26   =0464  225  =046D  6    =0489

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    DZERO   AVFR1   COMDI   DELON   FSIN    FCOS    TXX     AVFR2   FADDX   FSUB    FMPY    FMPYX   FDIV    FLD
 FLDX    FSTO    FSBR    FAXI    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   CARDZ   WCHRI
 READZ   SRED    SFIO    SIOF    SIOI    SUBSC   PRNZ    SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .000000E 00=00E4    .100000E 02=00E6    .572957E 02=00E8    .750000E-02=00EA    .114591E 03=00EC    .100000E 04=00EE
  .100000E-02=00F0    .600000E 02=00F2    .185325E 01=00F4    .978049E 03=00F6    .100528E 01=00F8    .528840E-02=00FA
  .590000E-05=00FC    .200000E 01=00FE    .500000E 03=0100    .100000E 03=0102

INTEGER CONSTANTS
     0=0104      1=0105      8=0106      3=0107   1959=0108   1970=0109      2=010A     10=010B     11=010C      9=010D
   100=010E   1000=010F

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    228  PROGRAM    944

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*TRANSFERTRACE
*ARITHMETICTRACE
*LISTALL
*ONE WORD INTEGERS
      SUBROUTINE AVFR1(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,DEG,NK)
C SUBROUTINE AVFR1 IS SUBROUTINE OF AVFRE.
C USED TO COMPILE THE AVERAGE
      IF(GLAT-SLAT)382,32,32
   32 IF(GLAT-ANLAT)33,382,382
   33 IF(GLONG-WLONG)34,35,35
   34 GLONG=GLONG+360.
   35 IF(GLONG-ELONG)37,382,382
   37 M=(GLAT-SLAT)/DEG+1.
      N=(GLONG-WLONG)/DEG+1.
      M=M*100
      MN=M+N
      READ(4'MN)HFM,K
      HFM=HFM+FA
      K=K+NK
      WRITE(4'MN)HFM,K
  382 RETURN
      END
VARIABLE ALLOCATIONS
   HFM(R )=0000          M(I )=0002          N(I )=0003          MN(I )=0004          K(I )=0005

STATEMENT ALLOCATIONS
 32   =0031  33   =0038  34   =003F  35   =0045  37   =004C  382  =008A

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FSUB    FDIV    FLD     SFAR    SIAR    IFIX    SFIF    SUBIN   SDRED   SDWRT   SDCOM   SDF     SDI

REAL CONSTANTS
  .360000E 03=0006    .100000E 01=0008

INTEGER CONSTANTS
   100=000A      4=000B

CORE REQUIREMENTS FOR AVFR1
 COMMON      0  VARIABLES      6  PROGRAM    134
```

```
 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
      SUBROUTINE AVFR2(WLONG,SLAT,DEG,KLAT,KLONG,ALPHA,IDI)
C AVFR2 IS SUBROUTINE OF AVFRE.
C USED TO PUNCH OUTPUT
      DO 2 M=1,KLAT
      AM=M
      L=M*100
      DO 2 N=1,KLONG
      MN=L+N
      READ(4'MN)HFM,K
      IF(K)2,2,21
   21 AK=K
      NK=AK
      AN=N
      W=HFM
      HF=HFM/AK
      GLAT=(AM-0.5)*DEG+SLAT
      GLONG= (AN-0.5)*DEG+WLONG
      IF(GLONG-180.)22,22,23
   23 GLONG=GLONG-360.
   22 WRITE(2,1000)GLAT,GLONG,HF,NK,W,ALPHA,IDI
      WRITE(5,1000)GLAT,GLONG,HF,NK,W,ALPHA,IDI
 1000 FORMAT(2F10.3,F10.2,I5,F10.0,27X,A4,I4)
    2 CONTINUE
      RETURN
      END
VARIABLE ALLOCATIONS
    AM(R )=0000        HFM(R )=0002        AK(R )=0004        AN(R )=0006        W(R )=0008        HF(R )=000A
  GLAT(R )=000C      GLONG(R )=000E         M(I )=0010         L(I )=0011        N(I )=0012        MN(I )=0013
     K(I )=0014         NK(I )=0015

STATEMENT ALLOCATIONS
 1000 =0021  21   =0063  23   =0097  22   =009D  2    =00C1

FEATURES SUPPORTED
 ONE WORD INTEGERS
```

```
CALLED SUBPROGRAMS
 FSUB    FMPY    FDIV    FLD     FSTO    IFIX    FLOAT   SWRT    SCOMP   SIOF    SIOI    SUBIN   SDRED   SDF     SDI

REAL CONSTANTS
  .500000E 00=0016    .180000E 03=0018    .360000E 03=001A

INTEGER CONSTANTS
     1=001C    100=001D      4=001E      2=001F      5=0020

CORE REQUIREMENTS FOR AVFR2
 COMMON      0  VARIABLES     22  PROGRAM    192

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ARITHMETICTRACE
*LISTALL
*ONE WORD INTEGERS
      SUBROUTINE DZERO(WLONG,ELONG,SLAT,ANLAT,DEG,KLAT,KLONG)
C SUBROUTINE DZERO IS SUBROUTINE OF AVFRE.
C USED TO ZERO DISK STORAGE
      DLAT=ANLAT-SLAT
      DLON=DELON(ELONG-WLONG)
      KLONG=DLON/DEG
      KLAT=DLAT/DEG
      K=0
      HFM=0.0
      DO 1 M=1,KLAT
      L=M*100
      DO 1 N=1,KLONG
      MN=L+N
    1 WRITE(4'MN)HFM,K
      RETURN
      END
VARIABLE ALLOCATIONS
  DLAT(R )=0000       DLON(R )=0002       HFM(R )=0004        K(I )=0008        M(I )=0009        L(I )=000A
     N(I )=000B         MN(I )=000C

STATEMENT ALLOCATIONS
 1     =0064
```

```
FEATURES SUPPORTED
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 DELON   FSUB    FDIV    FLD     FSTO    SFAR    SIAR    IFIX    SUBIN   SDWRT   SDCOM   SDF     SDI

REAL CONSTANTS
  .000000E 00=000E

INTEGER CONSTANTS
     0=0010      1=0011    100=0012      4=0013

CORE REQUIREMENTS FOR DZERO
 COMMON      0  VARIABLES     14  PROGRAM    114

 END OF COMPILATION
```

CONTROL CARDS AND INPUT

```
// JOB    2005 3005
// XEQ AVFRE    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
      -70.      -50.        0.       20.        5. V24 13       0    0    0    0
```

OUTPUT

```
    2.500   -52.500     -8.16   24     -196.                          V24  13
    7.500   -52.500    -34.94  222    -7757.                          V24  13
   12.500   -57.500    -65.68  175   -11495.                          V24  13
   12.500   -52.500    -40.66   71    -2887.                          V24  13
   17.500   -67.500   -189.33    2     -378.                          V24  13
   17.500   -62.500   -148.22  159   -23567.                          V24  13
   17.500   -57.500   -104.66   75    -7849.                          V24  13
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
*ONE WORD INTEGERS
C AVPLT
C     PLOT OF DEGREE AVERAGES
C FIRST CARD READ IS FOR MERCATOR GRID - SEE MEGRI AND MEGRW.
C AFTER THAT OUTPUT PUNCHED CARDS FROM AVFRE ARE READ IN AND PLOTTED.
      COMMONCC(23),B(160)
      READ(8,999)WLONG,ELONG,SLAT,ANLAT,SCALE,IGG,IGRI,IMIN
  999 FORMAT(5F10.0,3I5)
      CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
      IQUA=3
  997 READ(8,996)GLAT,GLON,FA,N
      Y=ALATI(GLAT,SLAT,ANLAT)
      X=ALONG(GLON,WLONG,ELONG,SCALE)
      IF(X)997,1501,1501
 1501 IF(Y)997,1500,1500
 1500 IF(FA)5,6,6
    6 NVAR=FA+0.5
      GO TO 7
    5 NVAR=FA-0.5
    7 X1=X+0.1
      Y1=Y-0.12
      SIZE=0.1
      CALL MECHA(X1,Y1,NVAR,IQUA,SIZE)
      X2=X+0.1
      Y2=Y+0.12
      SIZE=0.07
      CALL MECHA(X2,Y2,N,IQUA,SIZE)
      GO TO 997
  996 FORMAT(2F10.3,F10.2,I5)
      END
VARIABLE ALLOCATIONS
    CC(RC)=7FFE-7FD2     B(RC)=7FD0-7E92 WLONG(R )=0000      ELONG(R )=0002       SLAT(R )=0004      ANLAT(R )=0006
 SCALE(R )=0008       GLAT(R )=000A       GLON(R )=000C         FA(R )=000E          Y(R )=0010          X(R )=0012
    X1(R )=0014         Y1(R )=0016       SIZE(R )=0018         X2(R )=001A         Y2(R )=001C        IGG(I )=001E
  IGRI(I )=001F       IMIN(I )=0020       IQUA(I )=0021          N(I )=0022       NVAR(I )=0023

STATEMENT ALLOCATIONS
 999  =002E  996  =0033  997  =0079  1501 =0098  1500 =009D  6    =00A2  5    =00AB  7    =00B2

FEATURES SUPPORTED
 ONE WORD INTEGERS
```

```
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   ALATI   ALONG   MECHA   FSUB    FLD     FSTO    IFIX    TYPEZ   CARDZ   WCHRI   READZ   SRED    SFIO
 SIOF    SIOI    PRNZ    SDFIO

REAL CONSTANTS
  .500000E 00=0024    .100000E 00=0026    .120000E 00=0028    .700000E-01=002A

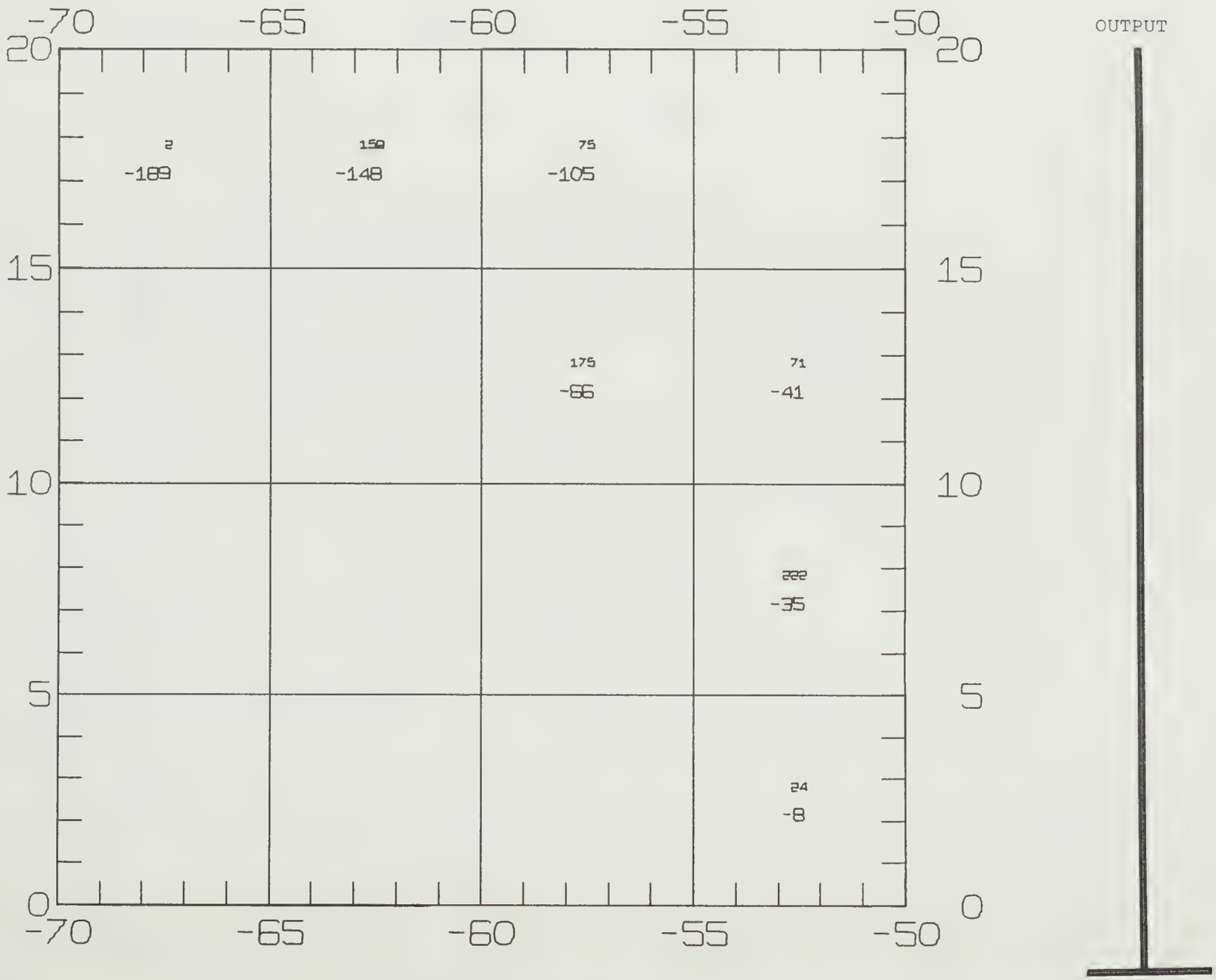
INTEGER CONSTANTS
     8=002C      3=002D

CORE REQUIREMENTS FOR
 COMMON    366  VARIABLES     36  PROGRAM    190

 END OF COMPILATION
```

CONTROL CARDS
AND INPUT

```
// JOB
// XEQ AVPLT
      -70.      -50.        0.       20.     .3574    5    2    0    1
     2.500   -52.500     -8.16   24     -196.                          V24  13
     7.500   -52.500    -34.94  222    -7757.                          V24  13
    12.500   -57.500    -65.68  175   -11495.                          V24  13
    12.500   -52.500    -40.66   71    -2887.                          V24  13
    17.500   -67.500   -189.33    2     -378.                          V24  13
    17.500   -62.500   -148.22  159   -23567.                          V24  13
    17.500   -57.500   -104.66   75    -7849.                          V24  13
```


-70
-65
-60
-55
-50
20
15
10
5
0
2
-189
150
-148
75
-105
175
-86
71
-41
222
-35
24
-8
OUTPUT

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*LISTALL
*TRANSFER TRACE
*ARITHMETIC TRACE
*ONE WORD INTEGERS
C
C BOUG
C BOUG CALCULATES THE SIMPLE BOUGUER GRAVITY FROM GRAVITY AND TOPO FILES
C ON DISK.
C
C     DISK FILE NAMES MUST BE INDICATED AT EXECUTION TIME.
C
C     *FILES(1,B----),(3,A----)
C
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 4(20000,5,U,INXT)
      DEFINE FILE 10(500,15,U,INXT)
      DEFINE FILE 11(1500,18,U,INXT)
      DEFINE FILE 12(500,11,U,INXT)
      DEFINE FILE 13(2500,16,U,INXT)
      DEFINE FILE 14(3536,1;U,INXT)
      DIMENSION AM(12),AY(11),THR(9),TMIN(9),G(9),V(68),KV(68),JTIM(9),JG(9)
     1G(9)
      COMMON AM,AY
C
C     SUBROUTINES USED - AMAY, COMDI
C
      CALL AMAY
      KS=0
      KT=0
      KKJ=0
      KJKJ=0
      JKK=0
C
C     THE FOLLOWING READ STATEMENT READS THE CRUISE AND LEG ID.
C
C     EXAMPLE-VEMA 20 NEW YORK-SAN JUAN
C
C     CARD COLUMN 1 MUST BE BLANK.  THE V FOR VEMA AND ETC. WOULD BEGIN IN
C     COLUMN 2.
C
      READ(8,5004)AAAA,BBBB,CCCC,DDDD,EEEE,FFFF,GGGG,HHHH,AABB,BBCC,CCDD
     1,DDEE
```

```
 5004 FORMAT(12A4)
C NSS1=00 FOR REGULAR EOTVOS, NSS1=01 FOR SPECIAL EOTVOS, THAT IS DR
C EOTVOS HAS BEEN APPLIED TO CHART READINGS.
C ISNEL=0 IF DATA ARE CHART READINGS, ISNEL NON ZERO IF DATA ARE FREE
C AIR GRAVITY ANOMALIES.
      READ(8,1010)NSS1,ISNEL
 1010 FORMAT(2I2)
      KJJ=48
      JJ=0
      JJJ=0
 6002 JJB=1
      KS=0
      KT=0
      KK=1
      JJJJ=0
      KB=1
C
C     STATEMENT 20 READS NAVIGATION DISK FILE 3.
C     READS-THE DISTANCE,IN NAUTICAL MILES, AT THE START OF THE LEG(DISA), THE
C     TOTAL NUMBER OF RECORDS IN THE 'B' FILE(I), THE MAXIMUM DISTANCE IN
C     NAUTICAL MILES  AT THE END OF THE LEG(DMAX), AND THE CRUISE ID(CRUIS).
C
   20 READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=2
C
C     THE FOLLOWING READ STATEMENT AND STATEMENT 9973 BOTH READ FROM NAVIGATION
C     DISK FILE 1.
C     READS- TOTAL TIME(TNAV1 , TNAV2), LATITUDE (PLAT1, PLAT2), LONGITUDE
C     (PLNG1, PLNG2), TOTAL DRIFT VECTOR (COURSE*10 + SPEED) FOR EOTVOS (SETE),
C     AND THE TIME ZONE (TZ).
C
C     FILE CONTAINS 1 REOCRD FOR EACH NAV. POINT.
C
      READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
      XXE=0.
      SET1=SETE
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      SET2=SETE
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      Q=(PLAT1+PLAT2)/2.
      CQ=FCOS(Q/57.29578)
      DEN=(PLAT2-PLAT1)/DELT
```

```
      DEM=DELCN(PLNG2-PLNG1)/DELT
      IF(NSS1)1001,1000,1001
 1001 KAZM=SET1/10.
      SET1=(SET1-KAZM*10.)*SIN(KAZM/57.29578)
      EOT2=.0075*CQ*SET1
      EOT=EOT2
      GO TO 1002
 1000 EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
 1002 FOT=1000.*EOT
      IF(JJJ)6001,6000,6001
 6000 GO TO (4012,2221),KB
C
C     THIS SECTION OF THE PROGRAM WILL CALCULATE AND STORE THE TOPOGRAPHY
C     ANSWERS ON DISK.
C
 4012 KS=KS+1
      READ(12'KS)JDAY,MON,JYR,TZ,LB,LC,NMZ,KT
      IF(JDAY)6,6,8000
 8000 IF(NMZ-NMZPR)601,802,601
  601 DO 603 NQQ=1,68
      KNQQ=(NMZ-1)*68+NQQ
      READ(14'KNQQ)KV(NQQ)
  603 V(NQQ)=KV(NQQ)
      NMZPR=NMZ
  802 CONTINUE
      KB=2
      IF(JDAY)6,6,85
   85 L=0
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
  221 KT=KT+1
      READ(13'KT)(JTIM(I),JG(I),I=1,8)
      DO 4399 I=1,8
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 4399 TMIN(I)=JTIM(I)-JJHR*100
      J=0
      L=L+1
      IF(L-LB)2216,2217,2217
 2216 LE=8
      GO TO 222
 2217 LE=LC
  222 J=J+1
      TTT=AA+THR(J)+TMIN(J)/60.
 2221 IF(TTT-TNAV2)2251,2251,225
 2251 IF(TTT-TNAV1)20,223,223
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
```

```
      LGG=THR(J)*100.+TMIN(J)
      I=1
 3330 X=I*100
      IF(G(J)-X)3331,3331,3332
 3332 I=I+1
      GO TO 3330
 3331 IF(I-1)3333,3334,3333
 3334 GGC=G(J)*V(I)/800.+3.
      GO TO 3335
 3333 GGC=G(J)*(V(I)+(G(J)-X)*(V(I)-V(I-1))/100.)/800.+3.
 3335 XGMC=GGC*1.829
      IGGC=GGC+.5
      LGG=THR(J)*100.+TMIN(J)
      IGG=G(J)
      JJ=JJ+1
C
C     THIS DISK WRITE STATEMENT STORES TOPOGRAPHY ANSWERS ON DISK FOR USE IN
C     THE SECOND PART OF THE PROGRAM.
C     STORES-ACCUMULATED DISTANCE AT THIS TOPO. POINT(GDIS), DEPTH IN CORRECTED
C     METERS(XGMC), DEPTH IN NOMINAL FATHOMS(IGG).
C
      WRITE(4'JJ)GDIS,XGMC,IGG
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,4012,4012
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      SET1=SET2
      M=M+1
      GO TO 9973
    6 JJJ=JJJ+1
      GO TO 6002
 6001 GO TO(602,6221),JJB
C
C     THIS SECTION OF THE PROGRAM CALCULATES THE GRAVITY ANSWERS, READS DISK
C     STORED TOPO. ANS., AND THEN CALCULATES THE SIMPLE BOUGUER ANOMALY.
C
C     STATEMENT 602 READS GRAVITY DAY CARDS.
C     READS-DAY(JDAY), MONTH(MON), YEAR(JYR), TIME ZONE(TZ), THE NUMBER OF
C     GRAVITY TIME/READING CARDS FOR THE DAY CARD (LB), THE NUMBER OF TIME
C     READINGS ON THE LAST CARD (LC), METER DIAL SETTING(JDIAL), DIAL RECORD
C     RATIO(DRR), METER CONSTANT(CF), AND G ZERO(GZ).
C
  602 KS=KS+1
      READ(10'KS)JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ,KT
  709 FORMAT(I2,I3,I5,F5.0,I3,I2,I5,F6.3,F7.4,F9.4)
      IF(JDAY)9050,1,9050
 9050 JJB=2
      L=0
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
```

```
      DIAL=JDIAL
      GZ=GZ+DIAL*CF*.001
      DRR=DRR*CF
C
C     STATEMENT 621 READS THE TIME/READING CARDS.
C     READS-HOUR(THR), MINUTES(TMIN), AND CHART READING FROM GRAVITY RECORDS.
C
  621 KT=KT+1
      READ(11'KT)(JTIM(I),JG(I),I=1,9)
      DO 2399 I=1,9
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
  710 FORMAT(9(F2.0,F2.0,F3.0,1X))
      J=0
      L=L+1
      IF(L-LB)6216,6217,6217
 6216 LE=9
      GO TO 622
 6217 LE=LC
  622 J=J+1
      TTT=AA+THR(J)+TMIN(J)/60.
 6221 IF(TTT-TNAV2)6251,623,225
 6251 IF(TTT-TNAV1)20,623,623
  623 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
      RLAT=GLAT/57.29578
      FI=978.049*(1.0052825-.0052884*
     1 (FCOS(RLAT)**2)+0.0000059*(FCOS(2.*RLAT)**2))
      IF(ISNEL)631,632,631
  631 IF(G(J)-500.)2000,2001,2001
 2001 G(J)=G(J)-1000.
 2000 FA=G(J)
      GRAV=FI+FA/1000.
      GO TO 634
  632 GRAV=GZ+DRR*G(J)*.001+EOT
      FA=(GRAV-FI)*1000.
  634 LGG=THR(J)*100.+TMIN(J)
      JDM=(JDAY*1000)+MON
      IF(KK-JJ)6003,6003,108
 6003 IF(JJJJ)6010,6004,6010
C
C     STATEMENT 6004 AND THE READ STATEMENT AFTER 6006 BOTH READ THE TOPOGRAPHY
C     ANSWERS THAT WERE STORED ON DISK BY THE FIRST PART OF THE PROGRAM.
C     READS-ACCUMULATED DISTANCE OF THE TOPO. POINT(GGDIS), DEPTH IN CORRECTED
C     METERS(XGMC), AND DEPTH IN NOMINAL FATHOMS(IGG).
C
```

```
 6004 READ(4'KK)GGDIS,XGMC,IGG
      FM=GGDIS
      FN=IGG
      FL=XGMC
      JJJJ=JJJJ+1
 6006 KK=KK+1
      READ(4'KK)GGDIS,XGMC,IGG
      EM=GGDIS
      EN=IGG
      EL=XGMC
 6010 IF(GDIS-FM)108,109,109
  108 IF(KJKJ)5021,5020,5021
 5020 KJKJ=1
      JKJK=1
      GO TO 5003
 5021 DISG=GDIS+.05
      DISKG=GDISK+.05
C
C     PRINTER ANSWERS
C     PRINTS-DAY(JDAY), MONTH(MON), TIME (LGG), LATITUDE(GLAT), LONGITUDE
C     (GLONG), DISTANCE IN NAUTICAL MILES (DISG), DISTANCE IN KILOMETER
C     (DISKG), INTERNATIONAL GRAVITY (GRAV),FREE-AIR ANOMALY (FA), CRUISE
C     ID (CRUIS), AND EOTVOS(FOT).
C
C     THIS STATEMENT IS USED ONLY WHEN THE SIMPLE BOUGUER ANOMALY ISN'T
C     CALCULATED.
C     THESE CASES ARE-(A) THE GRAVITY BEGINS BEFORE THE FIRST TOPO. POINT,
C     (B) THE GRAVITY CONTINUES BEYOND THE LAST TOPO. POINT,
C     (C) THE DISTANCE IN NAUTICAL MILES BETWEEN THE TWO TOPO. POINTS IS
C     GREATER THAN 10.
C
      WRITE(5,6007)JDAY,MON,LGG,GLAT,GLONG,DISG,DISKG,GRAV,FA,CRUIS,FOT
 6007 FORMAT(1X,I3,1X,I3,1X;I4,2X,F7.3,2X,F8.3,1X,F7.1,1X,F8.1,14X,F9.4,
     119X,F6.1,6X,A4,2X,F5.1)
      JKJK=3
      KJJ=KJJ+1
 5003 IF(KJJ-48)6008,5001,6008
 5001 KKJ=KKJ+1
      KJJ=0
C
C     THIS STATEMENT PRINTS THE CRUISE AND LEG ID AND PAGE NUMBER AT THE START
C     OF EACH NEW PAGE.
C
      WRITE(5,5002)AAAA,BBBB,CCCC,DDDD,EEEE,FFFF,GGGG,HHHH,AABB,BBCC,
     1CCDD,DDEE,KKJ
 5002 FORMAT(1H1,12A4,58X,4HPAGE,I3)
C
C     THE NEXT 3 WRITE STATEMENTS USING FORMATS 5010, 5005 AND 5006 PRINT TITLES
C     OVER THE COLUMNS OF PRINTED ANS.
C
      WRITE(5,5010)
```

```
 5010 FORMAT(//84X,6HSIMPLE)
      WRITE(5,5005)
 5005   FORMAT(39X,8HDISTANCE,8X,5HDEPTH,16X,5HDEPTH,3X,7HBOUGUER,1X,8HF
     1REE-AIR)
      WRITE(5,5006)
 5006 FORMAT(1H ,3HDAY,1X,3HMON,1X,4HTIME,1X,8HLATITUDE,1X,9HLONGITUDE,3
     1X,7HN.MILES,4X,3HKMS,3X,12HCORR. METERS,2X,4HGRAV,5X,8HNOM. FMS,2X
     2,5HANOM.,3X,5HANOM.,3X,6HCRUISE,1X,6HEOTVOS,/)
      GO TO (5021,5023,6008),JKJK
  109 IF(GDIS-EM)112,112,113
  112 R=(GDIS-FM)/(EM-FM)
      IF((EM-FM)-10.)500,500,9000
 9000 IF(GDIS-EM)9998,500,9998
 9998 IF(KJJ-48)5021,9999,5021
 9999 JKJK=1
      KJKJ=1
      GO TO 5001
  500 JB=FN+R*(EN-FN)+0.5
      XKK=FL+R*(EL-FL)
      KB=XKK+0.5
      BOU=FA+0.06873076*XKK
      IF(BOU)8017,8018,8018
 8017 KBOU=BOU-0.5
      GO TO 6121
 8018 KBOU=BOU+0.5
 6121 IF(KJKJ)5023,5022,5023
 5022 KJKJ=1
      JKJK=2
      GO TO 5003
 5023 DISG=GDIS+.05
      DISKG=GDISK+.05
C
C     PRINTER ANSWERS.
C     PRINTS-DAY(JDAY),MONTH(MON),TIME(LGG),LATITUDE(GLAT),LONGITUDE(GLONG),
C     DISTANCE IN NAUTICAL MILES(DISG),DISTANCE IN KILOMETERS(DISKG), DEPTH IN
C     CORRECTED METERS(KB), INTERNATIONAL GRAVITY(GRAV), DEPTH IN NOMINAL
C     FATHOMS(JB),SIMPLE BOUGUER ANOMALY(KBOU),FREE-AIR ANOMALY(FA), CRUISE
C     ID(CRUIS), AND EOTVOS(FOT).
C
      WRITE(5,8020)JDAY,MON,LGG,GLAT,GLONG,DISG,DISKG,KB,GRAV,JB,KBOU,FA
     1,CRUIS,FOT
 8020 FORMAT(1X,I3,1X,I3,1X,I4,2X,F7.3,2X,F8.3,1X,F7.1,1X,F8.1,4X,I6,4X,
     1F9.4,3X,I5,4X,I4,3X,F6.1,6X,A4,2X,F5.1)
      JKJK=3
      KJJ=KJJ+1
      GO TO 5003
  113 IF(KK-JJ)6011,108,108
 6011 FM=EM
      FN=EN
      FL=EL
      GO TO 6006
```

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 6008 IF(JDAY)68,1,68
   68 IF(J-LE)622,66,66
   66 IF(L-LB)621,602,602
    1 CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2   THR(R )=0048-0038  TMIN(R )=005A-004A     G(R )=006C-005C     V(R )=00F4-006E
  AAAA(R )=00F6       BBBB(R )=00F8       CCCC(R )=00FA       DDDD(R )=00FC       EEEE(R )=00FE       FFFF(R )=0100
  GGGG(R )=0102       HHHH(R )=0104       AABB(R )=0106       BBCC(R )=0108       CCDD(R )=010A       DDEE(R )=010C
  DISA(R )=010E       DMAX(R )=0110      CRUIS(R )=0112      TNAV1(R )=0114      PLAT1(R )=0116      PLNG1(R )=0118
  SETE(R )=011A         TZ(R )=011C        XXE(R )=011E       SET1(R )=0120        XXN(R )=0122        XXD(R )=0124
 TNAV2(R )=0126      PLAT2(R )=0128      PLNG2(R )=012A       DISB(R )=012C       SET2(R )=012E       DELT(R )=0130
 SPEED(R )=0132          Q(R )=0134         CQ(R )=0136        DEN(R )=0138        DEM(R )=013A       EOT2(R )=013C
   EOT(R )=013E        FOT(R )=0140         AA(R )=0142        TTT(R )=0144       GLAT(R )=0146      GLONG(R )=0148
  GDIS(R )=014A      GDISK(R )=014C          X(R )=014E        GGC(R )=0150       XGMC(R )=0152        DRR(R )=0154
    CF(R )=0156         GZ(R )=0158       DIAL(R )=015A       RLAT(R )=015C         FI(R )=015E         FA(R )=0160
  GRAV(R )=0162      GGDIS(R )=0164         FM(R )=0166         FN(R )=0168         FL(R )=016A         EM(R )=016C
    EN(R )=016E         EL(R )=0170       DISG(R )=0172      DISKG(R )=0174          R(R )=0176        XKK(R )=0178
   BOU(R )=017A         KV(I )=01C3-0180  JTIM(I )=01CC-01C4    JG(I )=01D5-01CD  INXT(I )=01D6         KS(I )=01D7
    KT(I )=01D8        KKJ(I )=01D9       KJKJ(I )=01DA        JKK(I )=01DB       NSS1(I )=01DC      ISNEL(I )=01DD
   KJJ(I )=01DE         JJ(I )=01DF        JJJ(I )=01E0        JJB(I )=01E1         KK(I )=01E2       JJJJ(I )=01E3
    KB(I )=01E4          I(I )=01E5      JBSYR(I )=01E6          M(I )=01E7       KAZM(I )=01E8       JDAY(I )=01E9
   MON(I )=01EA        JYR(I )=01EB         LB(I )=01EC         LC(I )=01ED        NMZ(I )=01EE      NMZPR(I )=01EF
   NQQ(I )=01F0       KNQQ(I )=01F1          L(I )=01F2       JJHR(I )=01F3          J(I )=01F4         LE(I )=01F5
   LGG(I )=01F6       IGGC(I )=01F7        IGG(I )=01F8      JDIAL(I )=01F9        JDM(I )=01FA       JKJK(I )=01FB
    JB(I )=01FC       KBOU(I )=01FD

UNREFERENCED STATEMENTS
 18      709     710

STATEMENT ALLOCATIONS
 5004 =0241  1010 =0244  709  =0247  710  =0252  6007 =0259  5002 =0270  5010 =027A  5005 =0282  5006 =029F  8020 =02EB
 6002 =0365  20   =037D  7002 =0391  7001 =0398  7003 =039C  9973 =03BD  1001 =0416  1000 =0442  1002 =0459  6000 =0464
 4012 =0469  8000 =0487  601  =048E  603  =04A7  802  =04C2  85   =04CB  221  =04D8  4399 =0519  2216 =0543  2217 =0549
 222  =054D  2221 =0566  2251 =056D  223  =0574  3330 =05AF  3332 =05C3  3331 =05CB  3334 =05D2  3333 =05EC  3335 =061D
 18   =064F  26   =0656  225  =065F  6    =067B  6001 =0683  602  =0688  9050 =06AC  621  =06D2  2399 =0713  6216 =073D
 6217 =0743  622  =0747  6221 =0760  6251 =0769  623  =0770  631  =07C2  2001 =07CE  2000 =07D9  632  =07EC  634  =0805
 6003 =0823  6004 =0828  6006 =0844  6010 =0860  108  =0867  5020 =086C  5021 =0876  5003 =08A6  5001 =08AD  109  =08E7
 112  =08EE  9000 =0905  9998 =090C  9999 =0913  500  =091D  8017 =0948  8018 =0951  6121 =0958  5022 =095D  5023 =0967
 113  =099F  6011 =09A6  6008 =09B4  68   =09B9  66   =09C0  1    =09C9

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    COMDI   FCOS    DELON   FSIN    TXX     FADDX   FSUB    FSUBX   FMPY    FMPYX   FDIV    FLD     FLDX    FSTO
 FSBR    FDVR    FAXI    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   WCHRI   READZ   SRED
 SWRT    SCCMP   SFIO    SIOF    SIOI    SUBSC   PRNZ    SDFIO   SDRED   SDWRT   SDCOM   SDIX    SDF     SDI
```

```
REAL CONSTANTS
  .000000E 00=0202    .200000E 01=0204    .572957E 02=0206    .100000E 02=0208    .750000E-02=020A    .114591E 03=020C
  .100000E 04=020E    .600000E 02=0210    .185325E 01=0212    .100000E 03=0214    .800000E 03=0216    .300000E 01=0218
  .182900E 01=021A    .500000E 00=021C    .100000E-02=021E    .978049E 03=0220    .100528E 01=0222    .528840E-02=0224
  .590000E-05=0226    .500000E 03=0228    .500000E-01=022A    .687307E-01=022C

INTEGER CONSTANTS
     0=022E      8=022F     48=0230      1=0231      3=0232   1959=0233   1970=0234      2=0235     12=0236     68=0237
    14=0238     13=0239    100=023A      4=023B     10=023C     11=023D      9=023E   1000=023F      5=0240

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    514  PROGRAM   1992

 END OF COMPILATION
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CONTROL CARDS AND INPUT

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// JOB    2005 3005
// XEQ BOUG     1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
 VEMA 24 RIO DE JANEIRO - MIAMI
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Only the first and last pages of BOUG output are given here.

OUTPUT

VEMA 24 RIO DE JANEIRO - MIAMI PAGE 1

DAY	MON	TIME	LATITUDE	LONGITUDE	DISTANCE N.MILES	DISTANCE KMS	DEPTH CORR. METERS	GRAV	DEPTH NOM. FMS	SIMPLE BOUGUER ANOM.	FREE-AIR ANOM.	CRUISE	EOTVOS
17	11	1045	-23.031	-43.086	1.9	3.5	43	978.8188	20	-16	-18.7	V24	46.3
17	11	1100	-23.046	-43.055	3.8	7.1	43	978.8201	20	-15	-18.3	V24	46.3
17	11	1115	-23.061	-43.025	5.7	10.6	53	978.8214	25	-14	-18.0	V24	46.3
17	11	1130	-23.076	-42.994	7.6	14.1	57	978.8227	27	-14	-17.7	V24	46.3
17	11	1140	-23.087	-42.974	8.9	16.5	61	978.8240	29	-13	-16.9	V24	46.3
17	11	1145	-23.092	-42.964	9.5	17.7	62	978.8240	30	-13	-17.2	V24	46.3
17	11	1150	-23.097	-42.954	10.2	18.9	64	978.8240	31	-13	-17.7	V24	46.3
17	11	1200	-23.107	-42.933	11.5	21.2	68	978.8266	33	-11	-15.8	V24	46.3
17	11	1227	-23.111	-42.872	14.9	27.6	68	978.8298	33	-8	-12.9	V24	52.1
17	11	1305	-23.118	-42.810	18.3	33.9	73	978.8375	36	-1	-5.6	V24	51.9
17	11	1315	-23.119	-42.787	19.6	36.3	76	978.8375	37	0	-5.6	V24	51.9
17	11	1330	-23.122	-42.753	21.5	39.8	80	978.8388	39	1	-4.5	V24	51.9
17	11	1345	-23.124	-42.719	23.3	43.3	81	978.8427	40	5	-0.8	V24	51.9
17	11	1400	-23.127	-42.685	25.2	46.8	83	978.8441	41	6	0.4	V24	51.9
17	11	1415	-23.129	-42.651	27.1	50.3	87	978.8466	43	9	2.8	V24	51.9
17	11	1428	-23.132	-42.621	28.8	53.3	89	978.8505	44	13	6.4	V24	51.9

17	11	1515	-23.139	-42.568	31.7	58.8	99	978.8574	49	20	12.8	V24	28.6
17	11	1530	-23.140	-42.549	32.8	60.7	100	978.8599	50	22	15.3	V24	28.6
17	11	1545	-23.141	-42.530	33.8	62.7	100	978.8626	50	25	18.0	V24	28.6
17	11	1556	-23.141	-42.517	34.6	64.1	102	978.8652	51	28	20.6	V24	28.6
17	11	1615	-23.142	-42.471	37.1	68.8	110	978.8734	55	36	28.5	V24	55.1
17	11	1630	-23.143	-42.434	39.1	72.5	112	978.8759	56	39	31.1	V24	55.1
17	11	1645	-23.144	-42.398	41.1	76.2	114	978.8759	57	39	31.1	V24	55.1
17	11	1700	-23.145	-42.362	43.1	79.9	114	978.8773	57	40	32.4	V24	55.1
17	11	1715	-23.145	-42.326	45.1	83.6	116	978.8773	58	40	32.2	V24	55.1
17	11	1730	-23.146	-42.290	47.1	87.3	116	978.8747	58	38	29.6	V24	55.1
17	11	1745	-23.147	-42.253	49.1	91.0	114	978.8720	57	35	26.9	V24	55.1
17	11	1800	-23.148	-42.217	51.1	94.7	121	978.8708	61	34	25.7	V24	55.1
17	11	1815	-23.148	-42.181	53.1	98.4	123	978.8668	62	30	21.7	V24	55.1
17	11	1830	-23.149	-42.145	55.1	102.1	119	978.8629	60	26	17.5	V24	55.1
17	11	1845	-23.150	-42.109	57.1	105.8	123	978.8590	62	22	13.6	V24	55.1
17	11	1900	-23.151	-42.072	59.1	109.5	125	978.8564	63	20	11.1	V24	55.1
17	11	1915	-23.151	-42.035	61.1	113.3	125	978.8554	63	19	10.1	V24	56.7
17	11	1930	-23.152	-41.998	63.2	117.1	125	978.8502	63	13	4.8	V24	56.7
17	11	1935	-23.152	-41.985	63.9	118.4	125	978.8488	63	12	3.5	V24	56.7
17	11	1945	-23.153	-41.961	65.3	120.9	125	978.8566	63	20	11.1	V24	56.7
17	11	2000	-23.154	-41.923	67.3	124.7	127	978.8619	64	25	16.3	V24	56.7
17	11	2015	-23.154	-41.886	69.4	128.6	127	978.8632	64	26	17.7	V24	56.7
17	11	2030	-23.155	-41.849	71.4	132.4	125	978.8619	63	25	16.3	V24	56.7
17	11	2045	-23.159	-41.809	73.6	136.5	123	978.8590	62	22	13.3	V24	61.6
17	11	2050	-23.160	-41.795	74.4	137.9	122	978.8563	61	19	10.3	V24	61.6
17	11	2100	-23.162	-41.768	75.9	140.7	119	978.8615	60	24	15.6	V24	61.6
17	11	2115	-23.166	-41.728	78.1	144.8	116	978.8695	58	31	23.3	V24	61.6
17	11	2130	-23.170	-41.687	80.4	149.0	112	978.8707	56	32	24.2	V24	61.6
17	11	2145	-23.173	-41.647	82.6	153.1	112	978.8747	56	36	28.0	V24	61.6
17	11	2200	-23.177	-41.606	84.9	157.3	106	978.8864	53	47	39.5	V24	61.6
17	11	2215	-23.181	-41.566	87.1	161.4	99	978.8928	49	52	45.6	V24	61.4
17	11	2230	-23.184	-41.525	89.4	165.6	97	978.8968	48	56	49.4	V24	61.4

VEMA 24 RIO DE JANEIRO - MIAMI

DAY	MON	TIME	LATITUDE	LONGITUDE	DISTANCE N.MILES	DISTANCE KMS	DEPTH CORR. METERS	GRAV	DEPTH NOM. FMS	SIMPLE BOUGUER ANOM.	FREE-AIR ANOM.	CRUISE	EOTVOS
14	12	2200	26.128	-79.188	5600.2	10378.6	360	979.0367	186	13	-11.4	V24	-67.3
14	12	2215	26.122	-79.235	5602.8	10383.3	413	979.0314	214	12	-16.3	V24	-67.3
14	12	2230	26.115	-79.281	5605.3	10388.0	477	979.0262	248	12	-21.1	V24	-67.3
14	12	2245	26.108	-79.328	5607.8	10392.7	538	979.0223	280	12	-24.5	V24	-67.3
14	12	2300	26.101	-79.374	5610.4	10397.4	589	979.0196	307	14	-26.7	V24	-67.3
14	12	2315	26.094	-79.421	5612.9	10402.1	634	979.0157	331	13	-30.1	V24	-67.3
14	12	2330	26.087	-79.467	5615.4	10406.8	685	979.0144	358	16	-31.1	V24	-67.3
14	12	2345	26.094	-79.514	5618.0	10411.6	744	979.0125	389	18	-33.3	V24	-67.8
15	12	0	26.104	-79.560	5620.6	10416.3	771	979.0145	407	21	-32.1	V24	-67.8
15	12	15	26.113	-79.607	5623.2	10421.1	726	979.0170	383	20	-30.2	V24	-67.8

15	12	30	26.122	-79.654	5625.7	10425.9	698	979.0209	368	21	-26.8	V24	-67.8
15	12	45	26.131	-79.701	5628.3	10430.7	675	979.0262	355	24	-22.2	V24	-67.8
15	12	100	26.140	-79.747	5630.9	10435.5	656	979.0368	345	33	-12.3	V24	-67.8
15	12	110	26.147	-79.779	5632.6	10438.6	565	979.0446	297	34	-5.0	V24	-67.8
15	12	120	26.153	-79.810	5634.3	10441.8	475	979.0539	248	36	3.7	V24	-67.8
15	12	130	26.159	-79.841	5636.1	10445.0	385	979.0665	200	42	15.9	V24	-67.8
15	12	145	26.168	-79.888	5638.6	10449.8	356	979.0717	185	45	20.7	V24	-67.8
15	12	200	26.177	-79.935	5641.2	10454.6	328	979.0758	170	47	24.0	V24	-67.8
15	12	215	26.187	-79.981	5643.8	10459.4	286	979.0758	148	43	23.3	V24	-67.8
15	12	222	26.191	-80.003	5645.0	10461.6	267	979.0758	137	41	23.0	V24	-67.8
15	12	245	26.149	-80.004	5647.7	10466.7	262	979.0791	135	47	29.4	V24	2.6
15	12	300	26.119	-80.002	5649.5	10469.9	272	979.0791	140	50	31.2	V24	2.6
15	12	315	26.091	-80.001	5651.2	10473.1	272	979.0617	140	35	16.1	V24	-10.7
15	12	330	26.069	-80.008	5652.6	10475.7	272	979.0590	140	34	15.0	V24	-10.7
15	12	345	26.047	-80.015	5654.0	10478.2	262	979.0565	135	32	14.0	V24	-10.7
15	12	400	26.026	-80.023	5655.3	10480.7	253	979.0551	130	32	14.1	V24	-10.7
15	12	445	25.999	-80.057	5658.2	10486.0		979.0682			29.0	V24	-20.0
15	12	500	25.978	-80.070	5659.6	10488.7		979.0709			33.3	V24	-20.0
15	12	506	25.969	-80.076	5660.2	10489.8		979.0732			36.1	V24	-18.9
15	12	530	25.927	-80.061	5662.9	10494.8		979.0753			41.2	V24	14.6
15	12	545	25.900	-80.051	5664.6	10497.9		979.0740			41.8	V24	14.6

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
*ARITHMETICTRACE
*TRANSFERTRACE
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
C GRDSK
C ADDITIONAL SUBROUTINE GRPL2
C GRDSK USES NAVIGATION DATA  AND GRAVITY DATA ON DISK TO PRINT
C GRAVITY ANSWERS AND/OR PLOT FREE AIR ANOMALY AGAINST NAUTICAL MILES.
C ISNEL=0 IF DATA ARE CHART READINGS, ISNEL NON ZERO IF DATA ARE FREE
C AIR GRAVITY ANOMALIES.
C JPLOT=1 FOR PRELIMINARY PLOT
C JPLOT=2 FOR PREFINAL PLOT
C JPLOT=3 FOR PLOT AT ARBITRARY SCALE(FACG,FACD,ZINCH)
C JPLOT=4 DO NOT PLOT
C JPLOT=5 FINAL PLOT
C JPRNT=0 DO NOT PRINT
C PRELIMINARY PLOT IS AT FIXED SCALE OF 50 MGAL TO INCH AND 50 N.M. TO
C INCH.
C PLOT IS MADE BETWEEN XMIN AND XMAX MILES ALONG TRACK.
C IF XMIN=0, PROGRAM SETS XMIN=DISA(INITIAL NAVIGATION DISTANCE).
C IF XMAX=0, PROGRAM SETS XMAX=DMAX(FINAL NAVIGATION DISTANCE).
C KS GRAVITY DAYS ARE SKIPPED.
C LAST DAY USED IS KSLAS.
C HOWEVER IF KSLAS=0, PROGRAM SETS KSLAS=300
C THE PRELIMINARY PLOT IS FOLDED(UNLESS XMAX IS LESS THAN 2000).
C THE ZEROS FOR THE FREE AIR SCALES ARE AT 8 AND 23 INCHES WHEN FOLDED
C FROM RIGHT EDGE OF PAPER.
C IF JN IS NONZERO A TRIANGLE IS PLOTTED AT EACH POINT.
C FOR PLOT AT ARBITRARY SCALE GRAVITY SCALE IS FACG MGAL TO INCH,
C DISTANCE SCALE IS FACD MILES TO INCH AND ZERO IS ZINCH INCHES FROM
C RIGHT EDGE.
C SHIFT IS USED FOR PREFINAL AND FINAL PLOTS.
C ZERO OF GRAVITY IS(14+SHIFT/100) INCHES FROM RIGHT EDGE FOR PREFINAL
C AND (360+SHIFT)/20 INCHES FOR FINAL PLOT.
      DEFINE FILE 4 (4000,3,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 10(500,15,U,INXT)
      DEFINE FILE 11(1500,18,U,INXT)
      DIMENSION AM(12),AY(11),THR(9),TMIN(9),G(9),JTIM(9),JG(9)
      COMMON AM,AY
      CALL AMAY
      DDIS=0.0
```

```
      KS=0
      KB=1
    8 READ(8,702)XMIN,XMAX,SHIFT,JPLOT,JPRNT,FACG,FACD,ZINCH,KS,KSLAS,IS
     1NEL,JN
  702 FORMAT(3F10.5,2I5,3F10.5,I3,I3,I2,I2)
      IF(KSLAS)501,501,502
  501 KSLAS=300
  502 CONTINUE
   20 READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      IF (JBSYR-1959)7001,7002,7002
 7002 IF (JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      IF(XMIN)53,53,61
   53 XMIN=DISA
   61 IF(XMAX)3,3,4
    3 XMAX=DMAX+1.
    4 LMAX2=XMAX/200
      AMAX2=LMAX2*100
   60 IF(XMAX-2000.)84,84,83
   84 AMAX2=6000.
      GO TO 62
   83 XF=XMAX
      MXF=XF
      JK=MXF/100
      JL=100*JK
      IF(JL-MXF)4100,4101,4101
 4100 MXF=JL+100
 4101 JX=MXF/2
      AMAX2=JX
   62 LMIN=XMIN/100.
      AMIN=LMIN*100
      CALL SCALF(1.,1.,0.,0.)
      CALL FPLOT(1,0.0,0.0)
      INDEX=1
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
      XXE=0.
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      DEN=(PLAT2-PLAT1)/DELT
       DEM=DELON(PLNG2-PLNG1)/DELT
      EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
      FOT=1000.*EOT
      GO TO(402,2221),KB
  402 KS=KS+1
```

```
      IF(KS-KSLAS)504,504,699
  699 JDAY=0
      GO TO 996
  504 CONTINUE
      READ(10'KS)JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ,KT
      KB=2
      IF(JDAY)996,996,85
   85 L=0
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
      DIAL=JDIAL
      GZ=GZ+DIAL*CF*.001
      DRR=DRR*CF
  221 KT=KT+1
      READ(11'KT)(JTIM(I),JG(I),I=1,9)
      DO 2399 I=1,9
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
      J=0
      L=L+1
      IF(L-LB)2216,2217,2217
 2216 LE=9
      GO TO 222
 2217 LE=LC
  222 J=J+1
      TTT=AA+THR(J)+TMIN(J)/60.
 2221 IF(TTT-TNAV2)2251,223,225
 2251 IF(TTT-TNAV1)20,223,223
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
      RLAT=GLAT/57.29578
      FI=978.049*(1.0052825-.0052884*
     1 (FCOS(RLAT)**2)+0.0000059*(FCOS(2.*RLAT)**2))
      IF(ISNEL)631,632,631
  631 IF(G(J)-500.)1000,1001,1001
 1001 G(J)=G(J)-1000.
 1000 FA=G(J)
      GRAV=FI+FA/1000.
      GO TO 634
  632 GRAV=GZ+DRR*G(J)*.001+EOT
      FA=(GRAV-FI)*1000.
  634 LGG=THR(J)*100.+TMIN(J)
      JDM=(JDAY*1000)+MON
  996       CALL GRPL2(XMIN,XMAX,AMIN,AMAX2,SHIFT,JPLOT,JPRNT,JDAY,MON,
     1LGG,GLAT,GLONG,GDIS,GDISK,FI,GRAV,FA,EOT,CRUIS,DMAX,FACD,FACG,ZINC
     2H,INDEX,DDIS,JN)
       IF(JDAY)18,6,18
```

```
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,402,402
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      M=M+1
      GO TO 9973
    6 IF(JPLOT-2)37,38,37
   38 Y1=(SHIFT/100.)+14.
      Y2=Y1-5.8
      X2=(GDIS-AMIN)/100.
      CALL FPLOT(1,X2,Y1)
      CALLFPLCT(2,X2,Y1)
      CALL FPLOT(0,X2,Y2)
      CALL FPLOT(0,0.0,Y2)
      CALL FPLOT(0,0.0,Y1)
      CALL FPLOT(0,X2,Y1)
      CALL FPLOT(1,X2,Y1)
   37 CALL EXIT
  709 FORMAT(I2,I3,I5,F5.0,1X,I2,I2,I5,F6.3,F7.4,F9.4)
  710 FORMAT(9(F2.0,F2.0,F3.0,1X))
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2   THR(R )=0034-0024  TMIN(R )=0046-0036     G(R )=0058-0048  DDIS(R )=005A
  XMIN(R )=005C       XMAX(R )=005E      SHIFT(R )=0060       FACG(R )=0062       FACD(R )=0064      ZINCH(R )=0066
  DISA(R )=0068       DMAX(R )=006A      CRUIS(R )=006C      AMAX2(R )=006E         XF(R )=0070       AMIN(R )=0072
 TNAV1(R )=0074      PLAT1(R )=0076      PLNG1(R )=0078       SETE(R )=007A         TZ(R )=007C        XXE(R )=007E
   XXN(R )=0080        XXD(R )=0082      TNAV2(R )=0084      PLAT2(R )=0086      PLNG2(R )=0088       DISB(R )=008A
  DELT(R )=008C      SPEED(R )=008E        DEN(R )=0090        DEM(R )=0092        EOT(R )=0094        FOT(R )=0096
   DRR(R )=0098         CF(R )=009A         GZ(R )=009C         AA(R )=009E       DIAL(R )=00A0        TTT(R )=00A2
  GLAT(R )=00A4      GLONG(R )=00A6       GDIS(R )=00A8      GDISK(R )=00AA       RLAT(R )=00AC         FI(R )=00AE
    FA(R )=00B0       GRAV(R )=00B2         Y1(R )=00B4         Y2(R )=00B6         X2(R )=00B8       JTIM(I )=00C6-00BE
    JG(I )=00CF-00C7  INXT(I )=00D0         KS(I )=00D1         KB(I )=00D2      JPLOT(I )=00D3      JPRNT(I )=00D4
 KSLAS(I )=00D5      ISNEL(I )=00D6         JN(I )=00D7          I(I )=00D8      JBSYR(I )=00D9      LMAX2(I )=00DA
   MXF(I )=00DB         JK(I )=00DC         JL(I )=00DD         JX(I )=00DE       LMIN(I )=00DF      INDEX(I )=00E0
     M(I )=00E1       JDAY(I )=00E2        MON(I )=00E3        JYR(I )=00E4         LB(I )=00E5         LC(I )=00E6
 JDIAL(I )=00E7         KT(I )=00E8          L(I )=00E9       JJHR(I )=00EA          J(I )=00EB         LE(I )=00EC
   LGG(I )=00ED        JDM(I )=00EE

UNREFERENCED STATEMENTS
 60      709     710

STATEMENT ALLOCATIONS
 702  =0128  709  =0133  710  =013F  8    =016D  501  =018D  502  =0191  20   =0191  7002 =01A5  7001 =01AC  7003 =01B0
 53   =01B5  61   =01B9  3    =01BE  4    =01C4  60   =01D4  84   =01DB  83   =01E1  4100 =01FF  4101 =0205  62   =0211
 9973 =024C  402  =02AB  699  =02B8  504  =02BE  85   =02E0  221  =0302  2399 =0343  2216 =036D  2217 =0373  222  =0377
 2221 =0390  2251 =0399  223  =03A0  631  =03F2  1001 =03FE  1000 =0409  632  =041C  634  =0435  996  =044C  18   =046D
 26   =0474  225  =047D  6    =0495  38   =049C  37   =04D5

FEATURES SUPPORTED
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```
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    SCALF   FPLOT   COMDI   DELON   FCOS    TXX     GRPL2   FADDX   FSUB    FMPY    FMPYX   FDIV    FLD     FLDX
 FSTO    FSBR    FDVR    FAXI    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   WCHRI   READZ
 SRED    SFIC    SIOF    SIOI    SUBSC   PRNZ    SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .000000E 00=00F2    .100000E 01=00F4    .200000E 04=00F6    .600000E 04=00F8    .100000E 03=00FA    .750000E-02=00FC
  .114591E 03=00FE    .100000E 04=0100    .100000E-02=0102    .600000E 02=0104    .185325E 01=0106    .572957E 02=0108
  .978049E 03=010A    .100528E 01=010C    .528840E-02=010E    .590000E-05=0110    .200000E 01=0112    .500000E 03=0114
  .140000E 02=0116    .580000E 01=0118

INTEGER CONSTANTS
     0=011A      1=011B      8=011C    300=011D      3=011E   1959=011F   1970=0120    200=0121    100=0122      2=0123
    10=0124     11=0125      9=0126   1000=0127

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    242  PROGRAM    996

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*TRANSFERTRACE
*ARITHMETICTRACE
*LISTALL
*ONE WORD INTEGERS
C GRPL2 IS A SUBROUTINE OF GRDSK.
      SUBROUTINE GRPL2(XMIN,XMAX,AMIN,AMAX2,SHIFT,JPLOT,JPRNT,JDAY,MON,
     1LGG,GLAT,GLONG,GDIS,GDISK,FI,GRAV,FA,EOT,CRUIS,DMAX,FACD,FACG,ZINC
     2H,INDEX,DDIS,JN)
      DIMENSION G(400),R(400)
      FOT=1000.*EOT
    4 IF(GDIS-XMIN)2,52,52
   52 IF(GDIS-XMAX)9000,9000,2
 9000 IF(JDAY)5,201,5
    5 IF(INDEX-1)50,51,50
   51 L=0
      KDAY=JDAY
      GO TO 202
   50 IF(JDAY-KDAY)201,202,201
  202 L=L+1
      INDEX=2
      G(L)=GDIS
      R(L)=FA
      GO TO 40
  201 DO 17 M=1,L
      GDIT=G(M)
      FB=R(M)
      GO TO(11,20,30,924,5005),JPLOT
   11 IF(GDIT-AMAX2)16,16,13
   13 X=(GDIT-AMAX2)/50.
      Y=(FB/50.)+23.
      GO TO 14
   16 X=(GDIT-AMIN)/50.
      Y=(FB/50.)+8
      GO TO 14
   20 X=(GDIT-AMIN)/100.
      Y=((FB+SHIFT)/100.)+11.8
      GO TO 14
   30 X=(GDIT-AMIN)/FACD
      Y=(FB/FACG)+ZINCH
      GO TO 14
   14 CALL FPLOT(-2,X,Y)
      IF(JN)141,17,141
  141 YY=Y+.04
      X1=X+.02
```

```
      X2=X-.02
      CALL FPLOT(0,X1,YY)
      CALL FPLOT(0,X2,YY)
      CALL FPLOT(0,X,Y)
      GO TO 17
 5005 IF(DDIS)5164,5000,5164
 5000 CALL SCALF(0.05,0.05,0.0,0.0)
      N3=XMIN/600.
  601 XONE=N3*600.
      XTWO=N3*600.+10.
      IF(DDIS-0.0)8001,8000,8001
 8001 CALL FPLOT(1,XONE,0.0)
 8000 CALL SCALF(0.05,0.05,XONE,0.0)
      CALL FPLOT(1,XONE,560.)
      DO 5163 K=1,14
      AK=K
      Y=560.-(AK-1.)*40.
      CALL FPLOT(-2,XONE,Y)
      CALL FPLOT(-1,XTWO,Y)
      II=0
 5163 CONTINUE
      N3=N3+1
 5164 IF(FB-(220.-SHIFT))520,520,521
  521 FB=FB-(220.-SHIFT)
      IF(FB-(220.-SHIFT))520,520,17
  520 IF(FB-(-360.-SHIFT))523,524,524
  523 FB=FB-(-360.-SHIFT)
      IF(FB-(-360.-SHIFT))17,524,524
  524 IF(GDIT)17,526,526
  526 IF(GDIT-N3*600.)5166,601,601
 5166 Y=FB-(-360.-SHIFT)
      IF(GDIT-XMIN)17,518,518
  518 IF(GDIT-XMAX)519,519,2
  519 IF((GDIT-DDIS)-10.)5191,5190,5190
 5190 CALL FPLOT(1,GDIT,Y)
      GO TO 102
 5191 IF(II)103,102,103
  102 CALL FPLOT(-2,GDIT,Y)
      II=II+1
      GO TO 104
  103 CALL FPLOT(0,GDIT,Y)
  104 DDIS=GDIT
      GO TO 17
   17 CONTINUE
  924 L=0
      KDAY=JDAY
         IF(JDAY)50,2,50
   40 IF(JPRNT)45,2,45
   45 WRITE(5,706)JDAY,MON,LGG,GLAT,GLONG,GDIS,GDISK,GRAV,FI,FA,CRUIS,
     1FOT
  706 FORMAT(I3,I3,I5,F7.3,F8.3,F7.1,F8.1,6XF9.4,F9.4,F6.1,A4,F5.1)
```

```
    2 RETURN
      END
VARIABLE ALLOCATIONS
     G(R )=031E-0000     R(R )=063E-0320   FOT(R )=0640       GDIT(R )=0642         FB(R )=0644          X(R )=0646
     Y(R )=0648         YY(R )=064A         X1(R )=064C         X2(R )=064E       XONE(R )=0650       XTWO(R )=0652
    AK(R )=0654          L(I )=065A       KDAY(I )=065B          M(I )=065C         N3(I )=065D          K(I )=065E
    II(I )=065F

STATEMENT ALLOCATIONS
 706   =0688  4     =06EC  52    =06F3  9000 =06FA  5     =06FF  51    =0706  50    =0710  202   =0717  201   =0732  11    =074D
 13    =0754  16    =0766  20    =077D  30   =0791  14    =07A3  141   =07B2  5005 =07D5  5000  =07DA  601   =07E7  8001  =07FE
 8000  =0803  5163  =0839  5164  =0848  521  =0851  520   =0862  523   =086C  524   =087F  526   =0884  5166  =088E  518   =089E
 519   =08A5  5190  =08AE  5191  =08B5  102  =08BA  103   =08CC  104   =08D1  17    =08D7  924   =08E0  40    =08EF  45    =08F4
 2     =0910

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FPLOT   SCALF   FSUB    FMPY    FDIV    FLD     FLDX    FSTO    FSBR    SFAR    SFARX   SIAR    IFIX    FLOAT   SIIF
 SFIF    SGOTO   SWRT    SCOMP   SIOF    SIOI    SUBSC   SNR     SUBIN

REAL CONSTANTS
  .100000E 04=0662    .500000E 02=0664    .230000E 02=0666    .100000E 03=0668    .118000E 02=066A    .400000E-01=066C
  .200000E-01=066E    .500000E-01=0670    .000000E 00=0672    .600000E 03=0674    .100000E 02=0676    .560000E 03=0678
  .100000E 01=067A    .400000E 02=067C    .220000E 03=067E    .360000E 03=0680

INTEGER CONSTANTS
     1=0682      0=0683      2=0684      8=0685      14=0686      5=0687

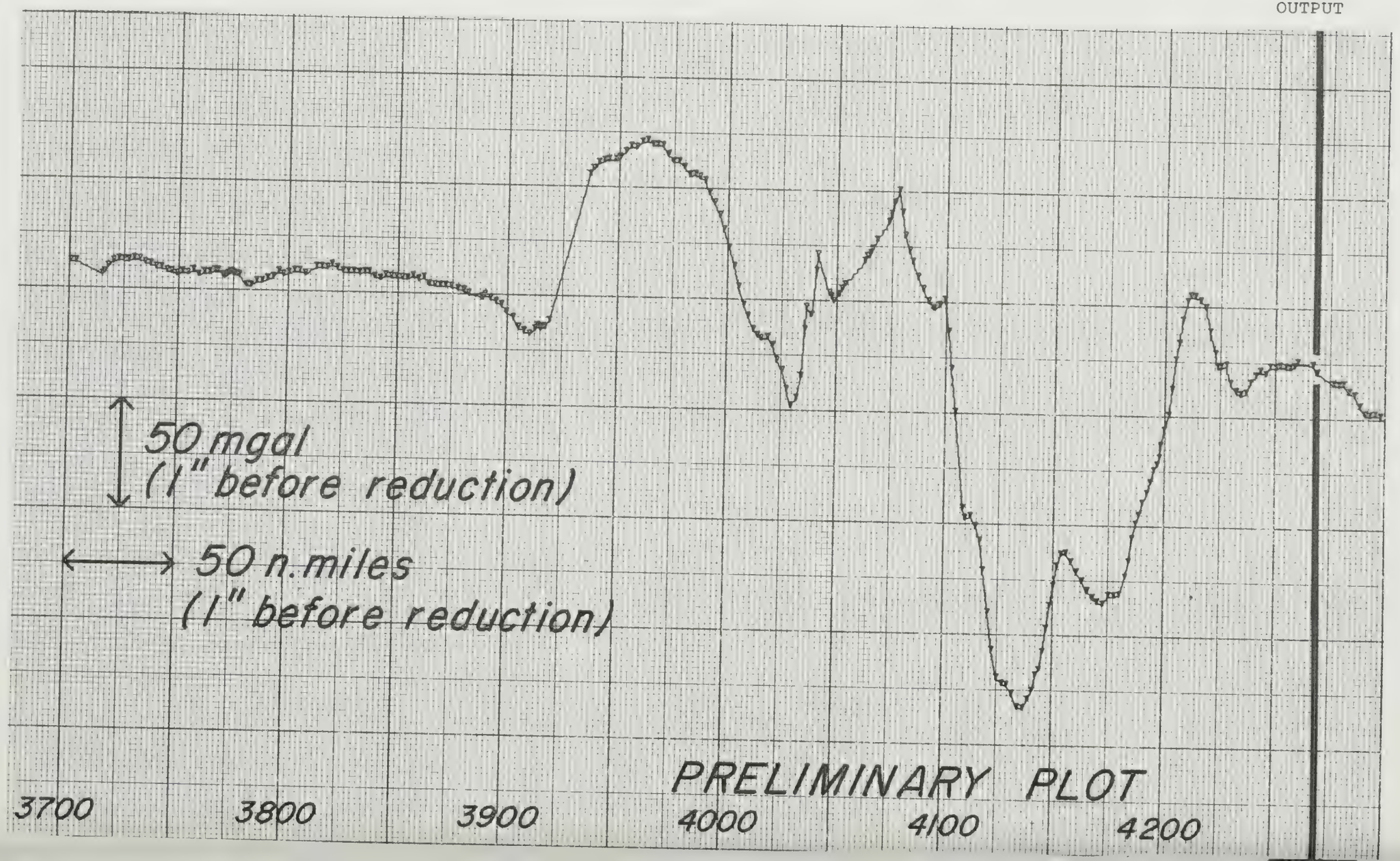
CORE REQUIREMENTS FOR GRPL2
 COMMON      0  VARIABLES   1634  PROGRAM    688

 END OF COMPILATION
```

```
// JOB     2005 3005
// XEQ GRDSK     1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
     3700.     4500.       0.0    1    1       50.       50.       0.0  0  0 0 1
```

CONTROL CARDS AND INPUT

OUTPUT



Only the first and last pages of GRDSK output are given here.

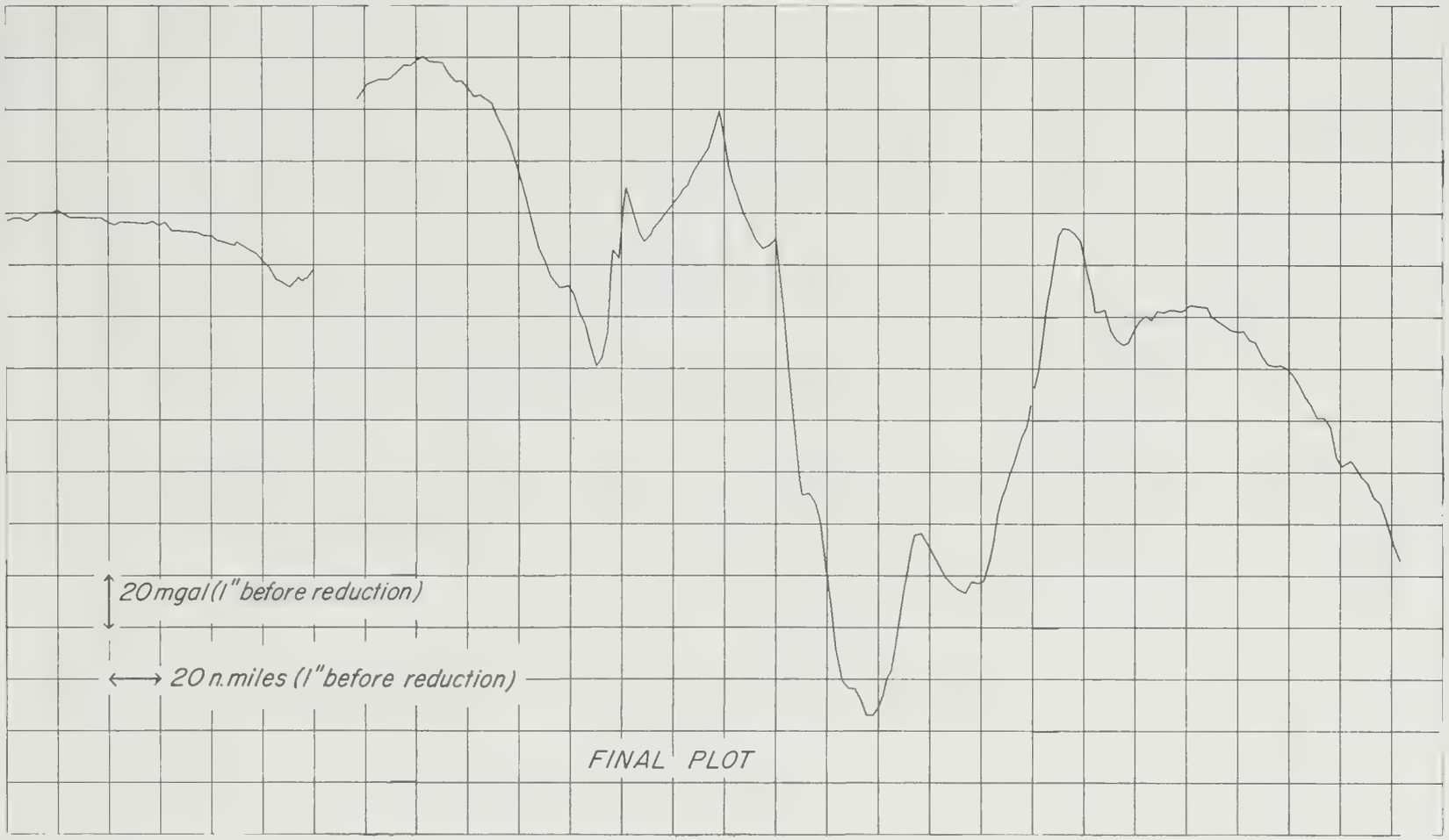
5	12	1645	11.768	-53.885	3701.0	6858.9	978.2246	978.2630	-38.4	V24	0.6
5	12	1700	11.808	-53.885	3703.4	6863.4	978.2259	978.2644	-38.4	V24	0.6
5	12	1815	11.844	-54.086	3715.4	6885.7	978.2214	978.2658	-44.4	V24	-70.4
5	12	1822	11.848	-54.105	3716.6	6887.8	978.2224	978.2658	-43.4	V24	-70.4
5	12	1830	11.852	-54.127	3717.9	6890.2	978.2249	978.2659	-41.0	V24	-70.4
5	12	1845	11.859	-54.168	3720.3	6894.7	978.2276	978.2662	-38.5	V24	-70.4
5	12	1900	11.867	-54.209	3722.8	6899.3	978.2290	978.2664	-37.4	V24	-70.4
5	12	1915	11.875	-54.250	3725.2	6903.8	978.2290	978.2669	-37.9	V24	-70.4
5	12	1930	11.883	-54.291	3727.7	6908.3	978.2290	978.2672	-38.2	V24	-70.4
5	12	1945	11.890	-54.332	3730.1	6912.8	978.2302	978.2674	-37.2	V24	-70.4
5	12	2000	11.898	-54.373	3732.5	6917.4	978.2302	978.2677	-37.4	V24	-70.4
5	12	2015	11.906	-54.413	3735.0	6921.9	978.2290	978.2679	-38.9	V24	-70.4
5	12	2030	11.913	-54.454	3737.4	6926.4	978.2290	978.2683	-39.3	V24	-70.4
5	12	2045	11.921	-54.495	3739.9	6931.0	978.2276	978.2685	-40.8	V24	-70.4
5	12	2100	11.929	-54.536	3742.3	6935.5	978.2276	978.2688	-41.1	V24	-70.4
5	12	2115	11.937	-54.577	3744.8	6940.0	978.2263	978.2690	-42.7	V24	-70.4
5	12	2128	11.943	-54.612	3746.9	6944.0	978.2263	978.2692	-42.9	V24	-70.4
5	12	2145	11.952	-54.658	3749.6	6949.0	978.2255	978.2697	-44.1	V24	-71.1
5	12	2200	11.960	-54.699	3752.1	6953.6	978.2269	978.2700	-43.0	V24	-71.1
5	12	2215	11.968	-54.741	3754.6	6958.2	978.2269	978.2702	-43.3	V24	-71.1
5	12	2230	11.975	-54.782	3757.0	6962.7	978.2282	978.2705	-42.2	V24	-71.1
5	12	2245	11.983	-54.823	3759.5	6967.3	978.2269	978.2708	-43.9	V24	-71.1
5	12	2300	11.991	-54.865	3762.0	6971.9	978.2282	978.2711	-42.8	V24	-71.1
5	12	2315	11.999	-54.906	3764.4	6976.5	978.2282	978.2713	-43.0	V24	-71.1
5	12	2330	12.007	-54.947	3766.9	6981.0	978.2296	978.2716	-41.9	V24	-71.1
5	12	2340	12.012	-54.975	3768.5	6984.1	978.2296	978.2718	-42.2	V24	-71.1
5	12	2400	12.020	-55.005	3770.4	6987.5	978.2279	978.2720	-44.1	V24	-36.0
5	12	2415	12.026	-55.026	3771.7	6989.9	978.2279	978.2723	-44.4	V24	-36.0
5	12	2430	12.033	-55.047	3773.0	6992.3	978.2292	978.2725	-43.3	V24	-36.0
5	12	2445	12.040	-55.067	3774.3	6994.7	978.2305	978.2730	-42.4	V24	-36.0
6	12	0	12.047	-55.088	3775.5	6997.1	978.2298	978.2731	-43.3	V24	-36.0
6	12	15	12.053	-55.109	3776.8	6999.5	978.2298	978.2734	-43.5	V24	-36.0
6	12	27	12.059	-55.126	3777.9	7001.4	978.2298	978.2736	-43.8	V24	-36.0
6	12	50	12.071	-55.189	3781.6	7008.3	978.2255	978.2739	-48.3	V24	-71.8
6	12	100	12.076	-55.217	3783.3	7011.4	978.2255	978.2741	-48.5	V24	-71.8
6	12	115	12.083	-55.258	3785.8	7016.0	978.2281	978.2744	-46.2	V24	-71.8
6	12	130	12.090	-55.300	3788.2	7020.6	978.2281	978.2746	-46.5	V24	-71.8
6	12	145	12.097	-55.342	3790.7	7025.2	978.2294	978.2751	-45.6	V24	-71.8
6	12	200	12.105	-55.383	3793.2	7029.8	978.2308	978.2753	-44.5	V24	-71.8
6	12	215	12.112	-55.425	3795.7	7034.4	978.2334	978.2755	-42.1	V24	-71.8
6	12	230	12.119	-55.467	3798.2	7039.0	978.2321	978.2757	-43.5	V24	-71.8
6	12	245	12.126	-55.509	3800.7	7043.7	978.2334	978.2760	-42.6	V24	-71.8
6	12	300	12.134	-55.550	3803.2	7048.3	978.2347	978.2762	-41.5	V24	-71.8
6	12	315	12.141	-55.592	3805.6	7052.8	978.2351	978.2767	-41.6	V24	-71.4
6	12	330	12.148	-55.633	3808.1	7057.4	978.2338	978.2769	-43.0	V24	-71.4

9	12	745	17.738	-61.203	4421.3	8193.8	978.3557	978.5268	-171.1	V24-57.3
9	12	800	17.761	-61.236	4423.6	8198.2	978.3676	978.5283	-160.6	V24-54.5
9	12	815	17.784	-61.270	4426.0	8202.5	978.3703	978.5294	-159.0	V24-54.5
9	12	830	17.807	-61.303	4428.4	8206.9	978.3768	978.5306	-153.8	V24-54.5
9	12	837	17.818	-61.319	4429.5	8208.9	978.3795	978.5311	-151.6	V24-54.5
9	12	920	17.867	-61.391	4434.5	8218.3	978.4005	978.5338	-133.3	V24-54.5
9	12	930	17.883	-61.413	4436.1	8221.2	978.4123	978.5345	-122.1	V24-54.5
9	12	940	17.898	-61.435	4437.7	8224.2	978.4255	978.5352	-109.7	V24-54.5
9	12	950	17.914	-61.458	4439.2	8227.1	978.4372	978.5362	-98.9	V24-54.5
9	12	1000	17.929	-61.480	4440.8	8230.0	978.4504	978.5368	-86.4	V24-54.5
9	12	1010	17.944	-61.502	4442.4	8232.9	978.4675	978.5378	-70.3	V24-54.5
9	12	1015	17.952	-61.513	4443.2	8234.4	978.4741	978.5383	-64.2	V24-54.5
9	12	1050	18.006	-61.591	4448.7	8244.6	978.5310	978.5410	-10.0	V24-54.5
9	12	1100	18.021	-61.614	4450.3	8247.5	978.5440	978.5417	2.3	V24-54.5
9	12	1110	18.037	-61.636	4451.8	8250.4	978.5611	978.5427	18.4	V24-54.5
9	12	1120	18.052	-61.659	4453.4	8253.4	978.5637	978.5434	20.2	V24-63.7
9	12	1130	18.066	-61.685	4455.2	8256.6	978.5650	978.5443	20.7	V24-63.7
9	12	1140	18.081	-61.712	4456.9	8259.8	978.5479	978.5450	2.9	V24-63.7
9	12	1150	18.096	-61.738	4458.6	8263.0	978.5322	978.5457	-13.5	V24-63.7
9	12	1200	18.111	-61.764	4460.4	8266.2	978.5020	978.5466	-44.5	V24-63.7
9	12	1210	18.126	-61.790	4462.1	8269.5	978.4765	978.5473	-70.8	V24-64.3
9	12	1220	18.140	-61.817	4463.9	8272.7	978.4569	978.5482	-91.3	V24-64.3
9	12	1245	18.178	-61.883	4468.2	8280.8	978.4318	978.5501	-118.2	V24-64.3
9	12	1300	18.200	-61.922	4470.9	8285.7	978.4266	978.5512	-124.6	V24-64.3
9	12	1310	18.215	-61.949	4472.6	8288.9	978.4174	978.5522	-134.7	V24-64.3
9	12	1320	18.230	-61.975	4474.4	8292.2	978.4108	978.5529	-142.0	V24-64.3
9	12	1330	18.245	-62.002	4476.1	8295.4	978.4017	978.5538	-152.0	V24-64.3
9	12	1335	18.252	-62.015	4477.0	8297.0	978.3978	978.5540	-156.2	V24-64.3
9	12	1355	18.282	-62.068	4480.5	8303.5	978.3761	978.5556	-179.5	V24-64.3
9	12	1400	18.289	-62.081	4481.4	8305.1	978.3735	978.5561	-182.6	V24-64.3
9	12	1415	18.312	-62.120	4484.0	8310.0	978.3669	978.5573	-190.4	V24-64.3
9	12	1430	18.334	-62.160	4486.6	8314.9	978.3708	978.5584	-187.6	V24-64.3
9	12	1440	18.349	-62.187	4488.4	8318.1	978.3840	978.5594	-175.4	V24-64.3
9	12	1450	18.364	-62.213	4490.1	8321.4	978.4075	978.5601	-152.5	V24-64.3
9	12	1500	18.379	-62.239	4491.9	8324.6	978.4338	978.5610	-127.1	V24-64.3
9	12	1505	18.386	-62.253	4492.7	8326.2	978.4509	978.5612	-110.3	V24-64.3
9	12	1540	18.437	-62.343	4498.7	8337.3	978.5744	978.5640	10.3	V24-63.6

```
// JOB     2005 3005
// XEQ GRDSK     1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
     3700.      4500.        0.0     5     0        0.0        0.0        0.0   0   0 0 0
```

CONTROL CARDS AND INPUT

OUTPUT



```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  000C        2005        2005        0000

// FOR
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*TRANSFER TRACE
*ARITHMETICTRACE
*ONE WORD INTEGERS
C MGRA4 WITH LINK MGRA5 ANNOTATES GRAV ON MERC, GRAV INPUT FROM DISK
C FOR WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG SEE MEGRW
C JG IS NON ZERO TO CALL MEGRW FOR INSIDE GRID AND ANNOTATIONS.
C      SIZE IS SIZE OF GRAVITY ANNOTATIONS
C      IF ICUT IS NON ZERO PROG WILL EXIT AFTER IT GOES OUT OF GRID ONCE
C      ICTHR IS NONZERO IF GRAV OUTPUT CARDS ARE USED.
C      NEWGR IS 0 IF PEN GOES BACK TO ORIGIN ,NON ZERO TO GO NEXT GRID
C ISNEL IS NONZERO IF VALUES STORED ON DISK ARE FREE AIR VALUES.
C VALUES MORE NEGATIVE THAN -100 HAVE BEEN COMPLEMENTED BY 1000.
C PROGRAM WILL IGNORE VALUES LESS THAN XMIN MILES OR MORE THAN XMAX
C MILES ALONG TRACK.
C HOWEVER, IF XMAX = 0, THE PROGRAM SETS IT = 99999.
C PROGRAM ALSO SKIPS FIRST KS DAYS
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      READ(8,700)WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG,JG
  700 FORMAT(5F10.5,4I5)
      CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      IF(JG)901,902,901
  901 CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
  902 CALL LINK(MGRA5)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88       IGRI(I )=0000       IMIN(I )=0001        IGG(I )=0002         JG(I )=0003

STATEMENT ALLOCATIONS
 700  =0005  901  =0044  902  =004E

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   FLD     FSTO    TYPEZ   SIIF    WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ    SDFIO

INTEGER CONSTANTS
     8=0004

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES      4  PROGRAM     78
```

```
 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*ONE WORD INTEGERS
*LISTALL
*ARITHMETICTRACE
*TRANSFERTRACE
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
C MGRA5
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 10(500,15,U,INXT)
      DEFINE FILE 11(1500,18,U,INXT)
      DIMENSION AM(12),AY(11),THR(9),TMIN(9),G(9),JTIM(9),JG(9)
      COMMON AM,AY,B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      CALL AMAY
      KS=0
      IND1=0
      KB=1
      READ(8,999) SIZE,IOUT,IOTHR,NEWGR,ISNEL,XMIN,XMAX,KS
  999 FORMAT(F10.5,4I5,2F10.5,I5)
      IF(XMAX)1301,1301,1302
 1301 XMAX=99999.
      GO TO 1302
 1302 CONTINUE
      XFRE=0.
      YFRE=0.
      INDEX=1
      IX=0
      IY=0
    9 IF(IOTHR)90,20,90
   90 READ(8,100)GLAT,GLONG,FA
  100 FORMAT(11X,F7.3,F8.3,39X,F6.1)
      GO TO 91
   20 READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      IF (JBSYR-1959)7001,7002,7002
 7002 IF (JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
```

```
      XXE=0.
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      DEN=(PLAT2-PLAT1)/DELT
      DEM=DELCN(PLNG2-PLNG1)/DELT
      EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
      FOT=1000.*EOT
      GO TO(402,2221),KB
  402 KS=KS+1
      READ(10'KS)JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ,KT
      KB=2
      IF(JDAY)6,6,85
   85 L=0
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
      DIAL=JDIAL
      GZ=GZ+DIAL*CF*.001
      DRR=DRR*CF
  221 KT=KT+1
       READ(11'KT)(JTIM(I),JG(I),I=1,9)
      DO 2399 I=1,9
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
      J=0
      L=L+1
      IF(L-LB)2216,2217,2217
 2216 LE=9
      GO TO 222
 2217 LE=LC
  222 J=J+1
      TTT=AA+THR(J)+TMIN(J)/60.
 2221 IF(TTT-TNAV2)2251,223,225
 2251 IF(TTT-TNAV1)20,223,223
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
   19 IF(GDIS-XMAX)1303,1303,6
 1303 CONTINUE
      RLAT=GLAT/57.29578
      FI=978.049*(1.0052825-.0052884*
     1 (FCOS(RLAT)**2)+0.0000059*(FCOS(2.*RLAT)**2))
      IF(ISNEL)631,632,631
  631 IF(G(J)-500.)1000,1001,1001
 1001 G(J)=G(J)-1000.
 1000 FA=G(J)
```

```
      GRAV=FI+FA/1000.
      GC TC 634
  632 GRAV=GZ+DRR*G(J)*.001+ECT
      FA=(GRAV-FI)*1000.
  634 LGG=THR(J)*100.+TMIN(J)
      JDM=(JDAY*1000)+MON
   91 CALL MERGR(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,SIZE,XFRE,YF
     1RE,INDEX,IX)
      IF(IOUT)301,92,301
  301 IF(IY)302,302,303
  302 IF(IX)92,92,305
  305 IY=1
      GO TO 92
  303 IF(IX)6,6,92
   92 IF(IOTHR)90,18,90
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,402,402
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      M=M+1
      GO TC 9973
    6 IF(NEWGR)61,60,61
   60 CALL FPLOT(1,0.,0.)
      GO TC 62
   61 X=(ELONG-WLONG)*SCALE+6.
      CALL FPLOT(1,X,0.0)
   62 CALL EXIT
  706 FORMAT(I3,I3,I5,F7.3,F8.3,F7.1,F8.1,6XF9.4,F9.4,F6.1,A4,F5.1)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88        THR(R )=002C-001C  TMIN(R )=003E-002E     G(R )=0050-0040  SIZE(R )=0052
  XMIN(R )=0054       XMAX(R )=0056       XFRE(R )=0058       YFRE(R )=005A       GLAT(R )=005C      GLONG(R )=005E
    FA(R )=0060       DISA(R )=0062       DMAX(R )=0064      CRUIS(R )=0066      TNAV1(R )=0068      PLAT1(R )=006A
 PLNG1(R )=006C       SETE(R )=006E         TZ(R )=0070        XXE(R )=0072        XXN(R )=0074        XXD(R )=0076
 TNAV2(R )=0078      PLAT2(R )=007A      PLNG2(R )=007C       DISB(R )=007E       DELT(R )=0080      SPEED(R )=0082
   DEN(R )=0084        DEM(R )=0086        EOT(R )=0088        FOT(R )=008A        DRR(R )=008C         CF(R )=008E
    GZ(R )=0090         AA(R )=0092       DIAL(R )=0094        TTT(R )=0096       GDIS(R )=0098      GDISK(R )=009A
  RLAT(R )=009C         FI(R )=009E       GRAV(R )=00A0          X(R )=00A2       JTIM(I )=00B0-00A8    JG(I )=00B9-00B1
  INXT(I )=00BA         KS(I )=00BB       IND1(I )=00BC         KB(I )=00BD       IOUT(I )=00BE      IOTHR(I )=00BF
 NEWGR(I )=00C0      ISNEL(I )=00C1      INDEX(I )=00C2         IX(I )=00C3         IY(I )=00C4          I(I )=00C5
 JBSYR(I )=00C6          M(I )=00C7       JDAY(I )=00C8        MON(I )=00C9        JYR(I )=00CA         LB(I )=00CB
    LC(I )=00CC      JDIAL(I )=00CD         KT(I )=00CE          L(I )=00CF       JJHR(I )=00D0          J(I )=00D1
    LE(I )=00D2        LGG(I )=00D3        JDM(I )=00D4

UNREFERENCED STATEMENTS
 9        19       706

STATEMENT ALLCCATIONS
 999  =0106  100  =010D  706  =0113  1301 =0160  1302 =0166  9    =017A  90   =017F  20   =018A  7002 =019E  7001 =01A5
 7003 =01A9  9973 =01C6  402  =0225  85   =024D  221  =026F  2399 =02B0  2216 =02DA  2217 =02E0  222  =02E4  2221 =02FD
 2251 =0306  223  =030D  19   =0336  1303 =033D  631  =0366  1001 =0372  1000 =037D  632  =0390  634  =03A9  91   =03C0
```

```
 301  =03D4  302  =03D9  305  =03DE  303  =03E4  92   =03E9  18   =03EE  26   =03F5  225  =03FE  6    =0416  60   =041B
 61   =0422  62   =0431

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    COMDI   DELON   FCOS    TXX     MERGR   FPLOT   FADDX   FSUB    FMPY    FMPYX   FDIV    FLD     FLDX    FSTO
 FSBR    FAXI    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   WCHRI   READZ   SRED    SFIO
 SIOF    SIOI    SUBSC   PRNZ    SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .999990E 05=00D8    .000000E 00=00DA    .750000E-02=00DC    .114591E 03=00DE    .100000E 04=00E0    .100000E-02=00E2
  .600000E 02=00E4    .185325E 01=00E6    .572957E 02=00E8    .978049E 03=00EA    .100528E 01=00EC    .528840E-02=00EE
  .590000E-05=00F0    .200000E 01=00F2    .500000E 03=00F4    .100000E 03=00F6    .600000E 01=00F8

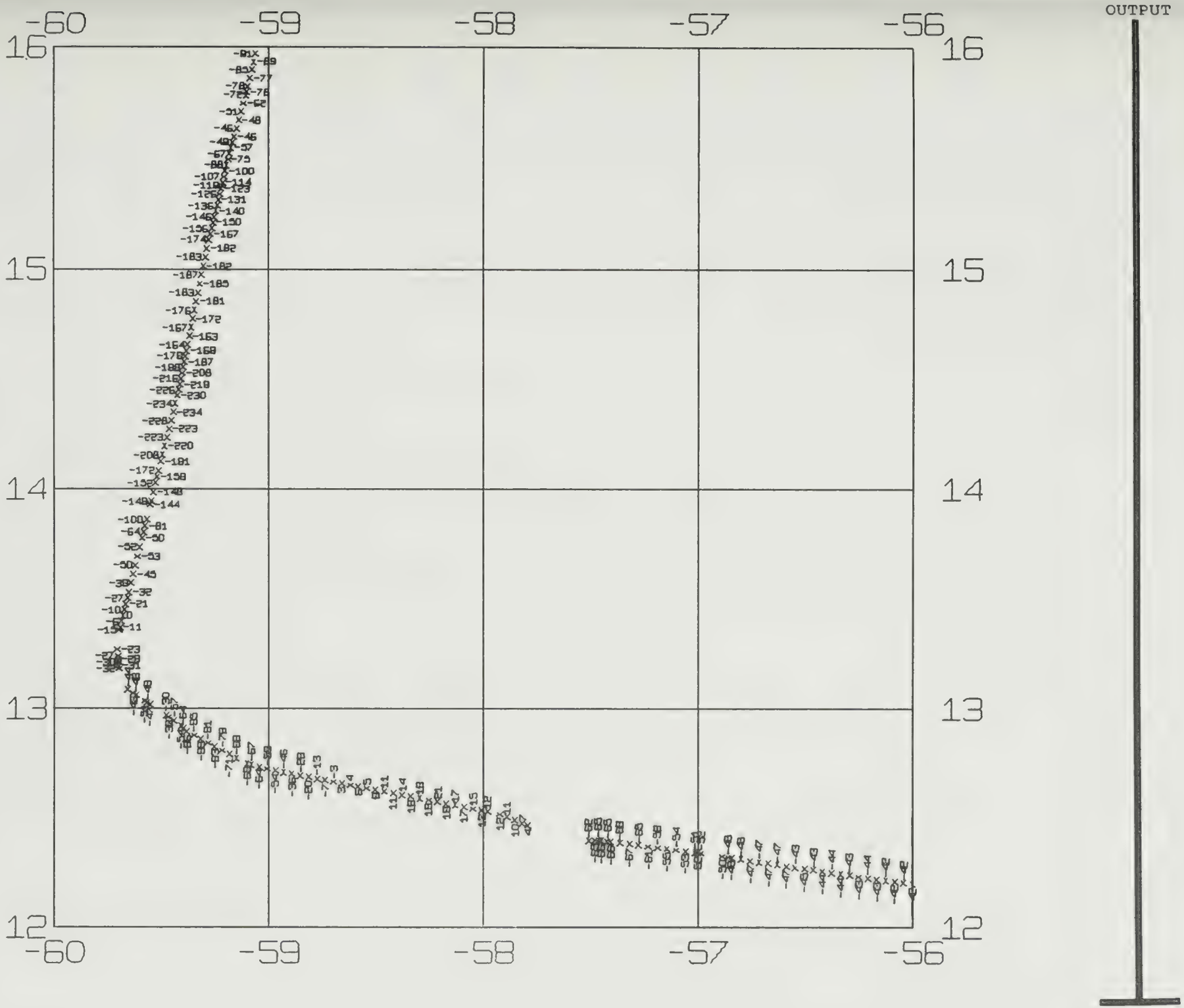
INTEGER CONSTANTS
     0=00FA      1=00FB      8=00FC      3=00FD   1959=00FE   1970=00FF      2=0100      10=0101      11=0102      9=0103
   100=0104   1000=0105

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES    216  PROGRAM    858

 END OF COMPILATION
```

CONTROL CARDS
AND INPUT

```
// JOB    2005 3005
// XEQ MGRA4    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
      -60.      -56.       12.       16.        2.    2    0    1    1
       .06    0    0    0    0        0.        0.    0
```


-60
-59
-58
-57
-56
16
15
14
13
12
OUTPUT

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*TRANSFER TRACE
*ARITHMETICTRACE
*ONE WORD INTEGERS
C      MGRA6 WITH LINK MGRA7 PLOTS GRAV ON MERC ALONG THE TRACK
C      GRAV INPUT FROM DISK
C FOR WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG SEE MEGRW
C JG NONZERO IF MEGRW IS USED
C INPUTS TO MGRA7 ARE AS FOLLOWS FOR SCALX,YLOW,YHIGH,NSP1,NSP2,NSP3,
C THET, SEE MERGP
C THET IS READ IN DEGREES.
C CONST IS CONSTANT SUBTRACTED FROM VALUE BEFORE PLOTTING.
C IOTHR IS NOT USED HENCE LEAVE BLANK
C FOR ISNEL SEE MGRA4
C PROGRAM WILL IGNORE VALUES LESS THAN XMIN MILES OR MORE THAN XMAX
C MILES.
C HOWEVER IF XMAX =0. PROGRAM SETS IT =99999.
C      IF IOUT IS NON ZERO PROG WILL EXIT AFTER IT GOES OUT OF GRID ONCE
C      NEWGR IS 0 IF PEN GOES BACK TO ORIGIN ,NON ZERO TO GO NEXT GRID
C KS IS NUMBER OF DAYS SKIPPED AT BEGINNING.
       COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
       READ(8,700)WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG,JG
  700  FORMAT(5F10.5,4I5)
       CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
       IF(JG)901,902,901
  901  CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
  902  CALL LINK(MGRA7)
       END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88       IGRI(I )=0000       IMIN(I )=0001       IGG(I )=0002        JG(I )=0003

STATEMENT ALLOCATIONS
 700  =0005  901  =0044  902  =004E

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   FLD     FSTO    TYPEZ   SIIF    WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ    SDFIO
```

```
INTEGER CONSTANTS
     8=0004

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES      4  PROGRAM     78

 END OF COMPILATION



// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*ONE WORD INTEGERS
*ARITHMETICTRACE
*LISTALL
*TRANSFERTRACE
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
C MGRA7
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 10(500,15,U,INXT)
      DEFINE FILE 11(1500,18,U,INXT)
      DIMENSION AM(12),AY(11),THR(9),TMIN(9),G(9),JTIM(9),JG(9)
      COMMON AM,AY,B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      CALL AMAY
      KS=0
      IND1=0
      KB=1
      YYM=ALATI(ANLAT,SLAT,ANLAT)
      READ(8,999)SCALX,IOUT,IOTHR,NEWGR,ISNEL,XMIN,XMAX,KS,YLOW,YHIGH,CO
     1NST,NSP1,NSP2,NSP3,THET
      THET=THET*.01745
  999 FORMAT(F10.5,4I5,2F10.5,I5,3F5.0,3I2,F4.0)
      IF(XMAX)1301,1301,1302
 1301 XMAX=99999.
      GO TO 1302
 1302 CONTINUE
      XFRE=0.
      YFRE=0.
      INDEX=1
      IX=0
      IY=0
   20 READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      IF (JBSYR-1959)7001,7002,7002
 7002 IF (JBSYR-1970)7003,7003,7001
```

```
7001 JBSYR=1959
7003 CONTINUE
     M=2
     READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
     XXE=0.
     XXN=0.
     XXD=0.
     PLAT1=0.0
     PLNG1=0.
     PLAT2=0.
     PLNG2=0.
     S=0.
     IY=0
     IX=0
9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
     INDEX=1
     CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
     DISB=DISA+XXD
     DELT=TNAV2-TNAV1
     SPEED=XXD/DELT
     DEN=(PLAT2-PLAT1)/DELT
     DEM=DELON(PLNG2-PLNG1)/DELT
     EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
     FOT=1000.*EOT
     GO TO(402,2221),KB
 402 KS=KS+1
     READ(10'KS)JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ,KT
     KB=2
     IF(JDAY)6,6,85
  85 L=0
     AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
     DIAL=JDIAL
     GZ=GZ+DIAL*CF*.001
     DRR=DRR*CF
 221 KT=KT+1
      READ(11'KT)(JTIM(I),JG(I),I=1,9)
     DO 2399 I=1,9
     JJHR=JTIM(I)/100
     THR(I)=JJHR
     G(I)=JG(I)
2399 TMIN(I)=JTIM(I)-JJHR*100
     J=0
     L=L+1
     IF(L-LB)2216,2217,2217
2216 LE=9
     GO TO 222
2217 LE=LC
 222 J=J+1
     TTT=AA+THR(J)+TMIN(J)/60.
2221 IF(TTT-TNAV2)2251,223,225
2251 IF(TTT-TNAV1)20,223,223
 223 GLAT=PLAT1+(TTT-TNAV1)*DEN
     GLONG=PLNG1+(TTT-TNAV1)*DEM
```

```
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
   19 IF(GDIS-XMAX)1303,1303,6
 1303 CONTINUE
      RLAT=GLAT/57.29578
      FI=978.049*(1.0052825-.0052884*
     1 (FCOS(RLAT)**2)+0.0000059*(FCOS(2.*RLAT)**2))
      IF(ISNEL)631,632,631
  631 IF(G(J)-500.)1000,1001,1001
 1001 G(J)=G(J)-1000.
 1000 FA=G(J)
      GRAV=FI+FA/1000.
      GO TO 634
  632 GRAV=GZ+DRR*G(J)*.001+EOT
      FA=(GRAV-FI)*1000.
  634 LGG=THR(J)*100.+TMIN(J)
      JDM=(JDAY*1000)+MON
      FA=FA-CONST
   91 CALL MERGP(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,YYM,PLAT1,PL
     1NG1,PLAT2,PLNG2,INDEX,XXE,XXN,SCALX,YLOW,YHIGH,IX,XXD,S,NSP1,NSP2,
     2NSP3,THET)
      IF(IOUT)301,18,301
  301 IF(IY)302,302,303
  302 IF(IX)18,18,305
  305 IY=1
      GO TO 18
  303 IF(IX)6,6,18
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,402,402
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      M=M+1
      GO TO 9973
    6 IF(NEWGR)61,60,61
   60 CALL FPLOT(1,0.,0.)
      GO TO 62
   61 X=(ELONG-WLONG)*SCALE+6.
      CALL FPLOT(1,X,0.0)
   62 CALL EXIT
  706 FORMAT(I3,I3,I5,F7.3,F8.3,F7.1,F8.1,6XF9.4,F9.4,F6.1,A4,F5.1)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88        THR(R )=002C-001C  TMIN(R )=003E-002E     G(R )=0050-0040    YYM(R )=0052
 SCALX(R )=0054       XMIN(R )=0056       XMAX(R )=0058       YLOW(R )=005A      YHIGH(R )=005C      CONST(R )=005E
  THET(R )=0060       XFRE(R )=0062       YFRE(R )=0064       DISA(R )=0066       DMAX(R )=0068      CRUIS(R )=006A
 TNAV1(R )=006C      PLAT1(R )=006E      PLNG1(R )=0070       SETE(R )=0072         TZ(R )=0074        XXE(R )=0076
   XXN(R )=0078        XXD(R )=007A      PLAT2(R )=007C      PLNG2(R )=007E         S(R )=0080      TNAV2(R )=0082
  DISB(R )=0084       DELT(R )=0086      SPEED(R )=0088        DEN(R )=008A       DEM(R )=008C        EOT(R )=008E
   FOT(R )=0090        DRR(R )=0092         CF(R )=0094         GZ(R )=0096        AA(R )=0098       DIAL(R )=009A
```

```
   TTT(R )=009C        GLAT(R )=009E       GLONG(R )=00A0        GDIS(R )=00A2       GDISK(R )=00A4        RLAT(R )=00A6
    FI(R )=00A8          FA(R )=00AA        GRAV(R )=00AC           X(R )=00AE        JTIM(I )=00BC-00B4     JG(I )=00C5-00BD
  INXT(I )=00C6          KS(I )=00C7        IND1(I )=00C8          KB(I )=00C9        IOUT(I )=00CA       IOTHR(I )=00CB
 NEWGR(I )=00CC       ISNEL(I )=00CD        NSP1(I )=00CE       NSP2(I )=00CF        NSP3(I )=00D0       INDEX(I )=00D1
    IX(I )=00D2          IY(I )=00D3           I(I )=00D4      JBSYR(I )=00D5           M(I )=00D6        JDAY(I )=00D7
   MON(I )=00D8         JYR(I )=00D9          LB(I )=00DA         LC(I )=00DB      JDIAL(I )=00DC          KT(I )=00DD
     L(I )=00DE        JJHR(I )=00DF           J(I )=00E0         LE(I )=00E1        LGG(I )=00E2         JDM(I )=00E3

UNREFERENCED STATEMENTS
 19      91      706

STATEMENT ALLCCATIONS
 999  =0116  706  =0122  1301 =018A  1302 =0190  20   =01A4  7002 =01B8  7001 =01BF  7003 =01C3  9973 =01FC  402  =025F
 85   =0287  221  =02A9  2399 =02EA  2216 =0314  2217 =031A  222  =031E  2221 =0337  2251 =0340  223  =0347  19   =0370
 1303 =0377  631  =03A0  1001 =03AC  1000 =03B7  632  =03CA  634  =03E3  91   =0400  301  =0421  302  =0426  305  =042B
 303  =0431  18   =0436  26   =043D  225  =0446  6    =045E  60   =0463  61   =046A  62   =0479

FEATURES SUPPCRTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    ALATI   COMDI   DELON   FCOS    TXX     MERGP   FPLOT   FADDX   FSUB    FMPY    FMPYX   FDIV    FLD     FLDX
 FSTO    FSBR    FAXI    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   WCHRI   READZ   SRED
 SFIO    SIOF    SIOI    SUBSC   PRNZ    SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .174500E-01=00E6    .999990E 05=00E8    .000000E 00=00EA    .750000E-02=00EC    .114591E 03=00EE    .100000E 04=00F0
  .100000E-02=00F2    .600000E 02=00F4    .185325E 01=00F6    .572957E 02=00F8    .978049E 03=00FA    .100528E 01=00FC
  .528840E-02=00FE    .590000E-05=0100    .200000E 01=0102    .500000E 03=0104    .100000E 03=0106    .600000E 01=0108

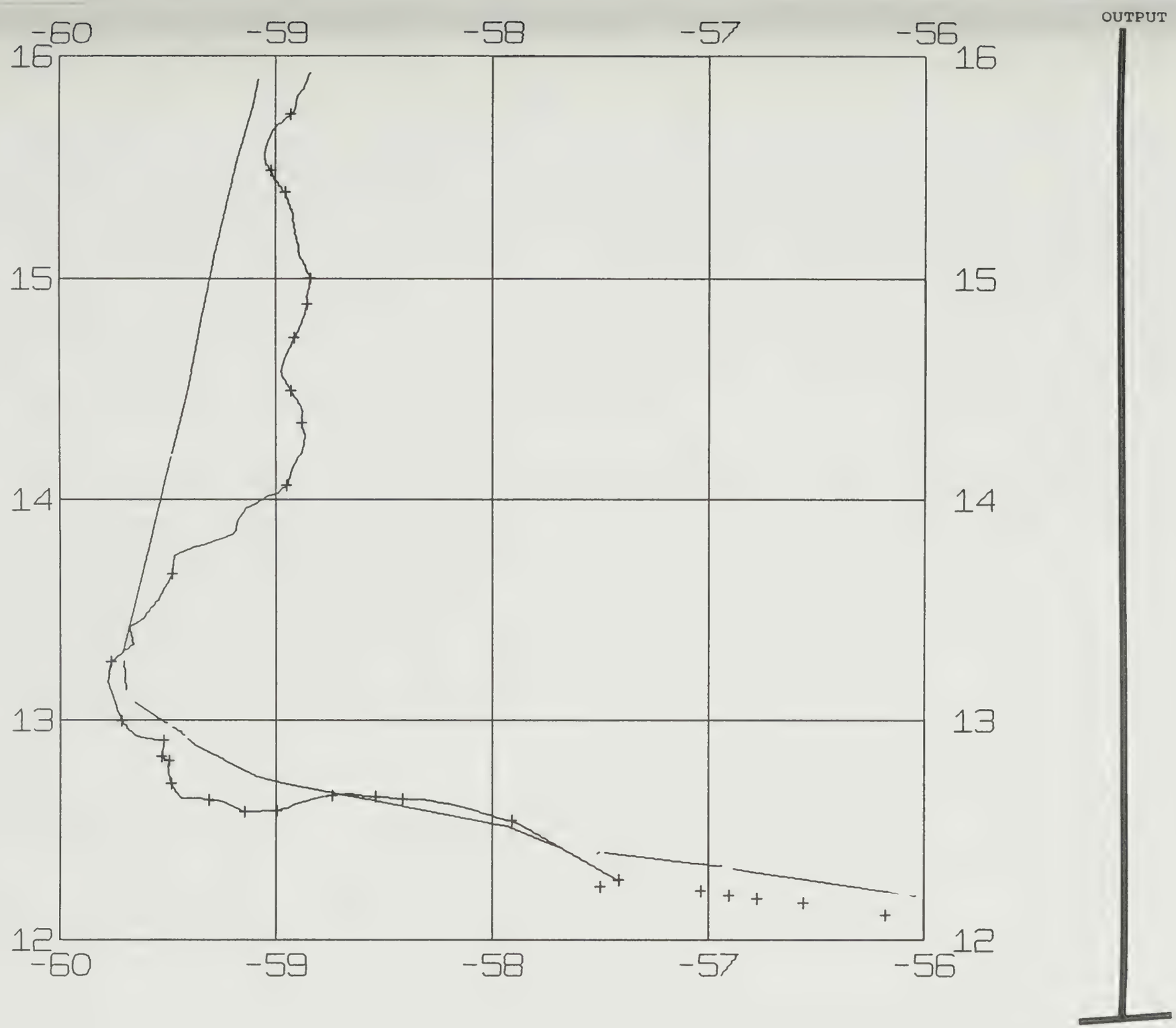
INTEGER CONSTANTS
     0=010A      1=010B      8=010C      3=010D   1959=010E   1970=010F      2=0110     10=0111     11=0112      9=0113
   100=0114   1000=0115

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES    230  PROGRAM    916

 END OF COMPILATION
```

CONTROL CARDS
AND INPUT

```
// JOB    2005 3005
// XEQ MGRA6    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
      -60.      -56.       12.       16.        2.    2    0    1    1
      200.    0    0    0    0        0.        0.    0   1.   1.   0. 0 0 0  0.
```


-60
-59
-58
-57
-56
16
15
14
13
12
OUTPUT

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*TRANSFER TRACE
*ARITHMETICTRACE
*LISTALL
*ONE WORD INTEGERS
C MGRAD
C STORES RAW GRAVITY DATA ON DISK
C DATA CONSISTS OF DAY CARDS FOLLOWED BY DATA AS A TIME SERIES
C JDAY, MON, JYR, TZ GIVE DAY, MONTH, YEAR, AND TIME ZONE FOR DAY CARD.
C LB IS NO. OF CARDS THAT DAY
C LC IS NO. OF POINTS LAST CARD
C GRAV=GZ+(JDIAL+JG(I)*DRR)*CF*.001 DEFINES THE CONSTANTS GZ,JDIAL,DRR,
C AND CF.
C DATA IS READ AS JHR(J),JMIN(J),JG(J) WHERE JG(J) ARE CHART READINGS.
C NINE TIME AND CHART READINGS ARE PUNCHED PER CARD.
C DATA ARE STORED IN 2 FILES, ONE FILE STORES DAY CARDS (INDEX KS) AND
C THE OTHER STORES TIME AND CHART VALUES (INDEX KT).
C FOR MONITORING PURPOSES EACH DAY CARD IS PRINTED OUT.
C ALSO PRINTED OUT ARE KS (DAY CARD =) AND KT (WHERE KT+1 WILL BE INDEX
C OF NEXT TIME SERIES POINT STORED).
C INSTEAD OF STORING RAW GRAVITY CHART READINGS, FREE AIR ANOMALIES CAN
C BE STORED.
C IF FREE AIR ANOMALY IS MORE NEGATIVE THAN -99, ADD 1000.
C IN ALL PROGRAMS THAT USE STORED GRAVITY DATA, SET ISNEL=0 IF RAW
C GRAVITY CHART READINGS HAVE BEEN STORED, SET ISNEL NON ZERO IF FREE
C AIR ANOMALIES HAVE BEEN STORED.
      DEFINE FILE 10(500,15,U,INXT)
      DEFINE FILE 11(1500,18,U,INXT)
        DIMENSION JTIM(9),JG(9),JHR(9),JMIN(9)
      KS=0
      KT=0
  204 READ(8,709)   JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ
  709 FORMAT(I2,I3,I5,F5.0,1X,I2,I2,I5,F6.3,F7.4,F9.4)
      KS=KS+1
      WRITE(10'KS)  JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ,KT
      WRITE(5,715)JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ,KT,KS
  715 FORMAT(I3,I3,I5,F5.1,I3,I3,I5,3F10.4,I5,I5)
      IF(JDAY)201,201,202
  202 DO 203 L=1,LB
       READ(8,710)(JHR(I),JMIN(I),JG(I),I=1,9)
  710 FORMAT(9(I2,I2,I3,1X))
      KT=KT+1
      DO 205 I=1,9
  205 JTIM(I)=JHR(I)*100+JMIN(I)
```

```
      WRITE(11'KT)(JTIM(I),JG(I),I=1,9)
  203 CONTINUE
      GO TO 204
  201 CALL EXIT
      END
VARIABLE ALLOCATIONS
    TZ(R )=000E        DRR(R )=0010        CF(R )=0012        GZ(R )=0014       JTIM(I )=001E-0016    JG(I )=0027-001F
   JHR(I )=0030-0028  JMIN(I )=0039-0031  INXT(I )=003A      KS(I )=003B         KT(I )=003C       JDAY(I )=003D
   MON(I )=003E        JYR(I )=003F        LB(I )=0040        LC(I )=0041      JDIAL(I )=0042          L(I )=0043
     I(I )=0044

STATEMENT ALLOCATIONS
 709  =004E  715  =005A  710  =0066  204  =008E  202  =00E6  205  =010E  203  =013E  201  =0149

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 FLD     FSTO    SIAR    SIARX   TYPEZ   SIIF    WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOIX   SIOF    SIOI
 SUBSC   PRNZ    SDFIO   SDWRT   SDCOM   SDIX    SDF     SDI

INTEGER CONSTANTS
     0=0046      8=0047      1=0048     10=0049      5=004A      9=004B    100=004C     11=004D

CORE REQUIREMENTS FOR
 COMMON      0  VARIABLES     70  PROGRAM    260

 END OF COMPILATION
```

CONTROL CARDS
AND INPUT

```
// JOB    2005 3005
// DUP
*STOREDATA  WS  UA  C2413    4      3005
*STOREDATA  WS  UA  D2413   18      3005
// XEQ MGRAD    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)


17 11 1967 +02. 0207 2400 2.633 0.4970 977.6072
1045-21 1100-20 1115-19 1130-18 1140-17 1145-17 1150-17 1200-15 1227-17
1305-11 1315-11 1330-10 1345-07 1400-06 1415-04 1428-01
17 11 1967 +02. 0501 2400 2.633 0.4970 977.6072
1515 22 1530 24 1545 26 1556 28 1615 14 1630 16 1645 16 1700 17 1715 17
1730 15 1745 13 1800 12 1815 09 1830 06 1845 03 1900 01 1915-01 1930-05
1935-06 1945 00 2000 04 2015 05 2030 04 2045-02 2050-04 2100 00 2115 06
2130 07 2145 10 2200 19 2215 24 2230 27 2235 28 2245 27 2300 25 2315 25
2330 26
18 11 1967 +02. 1101 2400 2.633 0.4970 977.6066
0015 24 0030 20 0045 18 0100 21 0115 24 0130 27 0140 28 0150 27 0200 18
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2140-44 2150-25 2200 00 2210 28 2220 54 2230 76 2240 94 2248103
09 12 1967 +04. 0105 2000 2.642 0.4970 977.5982
2300 27 2315 29 2330 10 2340-01 2350-14
10 12 1967 +04. 0308 2000 2.643 0.4970 977.6001
0000-26 0010-36 0020-48 0030-55 0040-61 0050-67 0100-70 0110-73 0120-77
0130-82 0145-86 0200-79 0215-72 0230-70 0245-76 0300-80 0315-86 0330-86
0345-84 0400-80 0415-76 0430-77 0445-81 0500-87 0510-91 0520-96
10 12 1967 +04. 0405 1800 2.643 0.4970 977.6001
0530-24 0545-26 0552-27 0610-52 0620-52 0630-51 0638-50 0830-75 1340-32
1350-28 1400-20 1415-16 1430-12 1445-09 1500-03 1508 00 1535 11 1545 16
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1600 22 1615 28 1630 34 1645 38 1700 45 1715 48 1740 61 1750 63 1800 69
1810 76 1820 81 1830 88 1840 94 1850100
10 12 1967 +04. 0204 2000 2.643 0.4970 977.6001
1903 34 1910 39 1920 44 1930 50 1940 56 1950 63 2000 68 2015 72 2030 76
2045 80 2100 89 2110 94 2120 99
10 12 1967 +04. 0201 2200 2.643 0.4970 977.6001
2130 26 2145 28 2200 31 2215 36 2228 37 2245 40 2300 44 2315 47 2330 50
2345 53
11 12 1967 +04. 0901 2200 2.644 0.4970 977.6019
0000 57 0015 59 0030 61 0045 61 0100 60 0115 61 0130 63 0145 66 0200 65
0215 64 0230 64 0245 62 0300 63 0315 63 0330 64 0345 68 0400 71 0415 72
0430 73 0445 72 0500 71 0515 70 0530 68 0545 69 0600 70 0615 71 0630 71
0645 72 0700 73 0715 74 0730 74 0745 72 0800 71 0813 70 0830 69 0845 69
0900 69 0915 69 0930 69 0945 70 1000 71 1015 73 1030 74 1045 75 1100 74
1115 76 1130 78 1145 77 1200 78 1215 79 1220 80 1230 79 1245 79 1300 79
1315 80 1330 81 1345 82 1400 83 1415 80 1430 80 1445 80 1500 81 1515 83
1530 84 1545 84 1600 84 1615 84 1630 85 1645 86 1700 87 1715 87 1727 89
1800 92
11 12 1967 +04. 01 9 2400 2.644 0.4970 977.6019
2150 20 2158 23 2215 25 2230 26 2245 27 2300 28 2315 30 2330 32 2345 33
12 12 1967 +04. 07 8 2400 2.646 0.4970 977.6037
0000 35 0015 35 0030 35 0045 36 0100 37 0115 38 0130 39 0145 40 0200 43
0215 45 0230 46 0245 47 0300 48 0315 50 0330 53 0345 54 0400 58 0415 59
0430 59 0445 59 0500 59 0515 61 0530 62 0545 64 0550 65 0600 64 0615 63
0630 64 0645 65 0700 68 0715 69 0730 70 0745 72 0800 74 0815 76 0830 77
0845 77 0900 77 0915 77 0930 78 0945 78 1000 78 1015 79 1030 79 1045 80
1100 80 1115 81 1130 82 1145 83 1200 84 1215 86 1230 86 1245 89 1300 90
1315 91 1330 92 1345 94 1400 96 1415 97 1430 98 1445 98 1500100
12 12 1967 +04. 0308 2600 2.646 0.4970 977.6037
1830 27 1845 28 1900 29 1915 30 1928 31 1945 33 2000 34 2015 35 2030 36
2045 39 2100 42 2115 46 2130 49 2145 51 2200 54 2215 57 2233 63 2245 64
2253 65 2315 75 2330 74 2345 74 2400 75 2415 74 2430 73 2445 74
13 12 1967 +05. 0106 2600 2.647 0.4970 977.6055
0000 75 0015 77 0030 79 0045 79 0100 79 0115 78
13 12 1967 +05. 07 3 2800 2.647 0.4970 977.6055
0130 02 0145 02 0200 02 0215 00 0230-01 0245-01 0300 00 0315-01 0330 00
0345 00 0400-01 0415 00 0430 01 0445 01 0500 01 0517 01 0540-26 0600-26
0615-25 0630-25 0645-25 0700-25 1202-54 1220-79 1335-27 1345-27 1400-27
1415-28 1652-07 1700-07 1715-05 1730-04 1745-03 1800-01 1815-01 1830 00
1845 03 1900 05 1915 08 1930 10 1945 14 2000 18 2015 19 2030 22 2045 23
2100 25 2115 25 2130 26 2150 26 2200 27 2215 28 2230 29 2245 29 2300 29
2315 29 2330 28 2345 27
14 12 1967 +05. 13 6 2800 2.648 0.4970 977.6073
0000 26 0015 24 0030 22 0045 19 0100 16 0115 13 0130 09 0145 06 0200 02
0215-01 0230-05 0245-07 0300-09 0315-12 0330-14 0345-16 0400-18 0415-19
0430-20 0445-20 0500-22 0515-24 0535-22 0545-23 0600-25 0615-26 0630-28
0645-29 0700-27 0710-23 0720-14 0730 02 0740 25 0750 48 0753 58 0802 75
0807 77 0810 70 0820 55 0830 43 0840 40 0850 32 0900 36 0910 56 0915 58
0920 47 0930 21 0940-01 1002-23 1010-29 1020-33 1030-29 1040-15 1045-07
1100 07 1110 15 1120 22 1130 26 1145 27 1150 28 1200 26 1215 17 1230 12
1245 08 1300 05 1310 05 1320 11 1330 20 1340 27 1350 38 1400 47 1405 52
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1415 65 1420 71 1430 75 1444 77 1505 74 1515 73 1530 73 1540 78 1550 81
1600 80 1615 76 1630 75 1645 74 1700 74 1715 74 1730 73 1745 71 1800 69
1815 68 1830 67 1845 68 1900 68 1915 68 1930 68 1945 68 2000 70 2015 73
2018 74 2040 79 2050 84 2100 89 2115 90 2130 90 2150 82 2200 80 2215 76
2230 72 2245 69 2300 67 2315 64 2330 63 2345 62
15 12 1967 +05. 0107 2800 2.649 0.4970 977.6092
0000 62 0015 64 0030 67 0045 71 0100 79 0110 85 0120 92
15 12 1967 +05. 0207 3000 2.649 0.4970 977.6092
0130 26 0145 30 0200 33 0215 33 0222 33 0245-18 0300-18 0315-21 0330-23
0345-25 0400-26 0445-09 0500-07 0506-06 0530-30 0545-31
```

Input data must be followed by a blank card.

OUTPUT

17	11	1967	2.	2	7	2400	2.6330	0.4970	977.6073	0	1
17	11	1967	2.	5	1	2400	2.6330	0.4970	977.6073	2	2
18	11	1967	2.	11	1	2400	2.6330	0.4970	977.6066	7	3
19	11	1967	2.	10	3	2400	2.6340	0.4970	977.6059	18	4
20	11	1967	2.	9	3	2400	2.6340	0.4970	977.6053	28	5
21	11	1967	2.	2	7	2400	2.6340	0.4970	977.6047	37	6
21	11	1967	2.	10	6	2200	2.6340	0.4970	977.6047	39	7
22	11	1967	2.	1	2	2200	2.6350	0.4970	977.6041	49	8
22	11	1967	2.	7	7	2000	2.6350	0.4970	977.6041	50	9
22	11	1967	2.	3	1	1800	2.6350	0.4970	977.6041	57	10
23	11	1967	2.	8	3	1800	2.6350	0.4970	977.6035	60	11
23	11	1967	2.	4	4	1600	2.6350	0.4970	977.6035	68	12
24	11	1967	2.	2	3	1600	2.6350	0.4970	977.6029	72	13
24	11	1967	2.	8	7	1400	2.6350	0.4970	977.6029	74	14
25	11	1967	2.	1	8	1400	2.6360	0.4970	977.6022	82	15
25	11	1967	2.	10	9	1200	2.6360	0.4970	977.6022	83	16
26	11	1967	2.	8	1	1200	2.6360	0.4970	977.6015	93	17
26	11	1967	2.	3	3	1000	2.6360	0.4970	977.6015	101	18
27	11	1967	2.	11	7	1000	2.6370	0.4970	977.6009	104	19
28	11	1967	2.	10	1	1000	2.6370	0.4970	977.6003	115	20
29	11	1967	3.	10	3	1000	2.6370	0.4970	977.5996	125	21
30	11	1967	3.	10	6	1000	2.6380	0.4970	977.5991	135	22
1	12	1967	3.	10	4	1000	2.6380	0.4970	977.5985	145	23
2	12	1967	3.	12	2	1000	2.6380	0.4970	977.5979	155	24
3	12	1967	3.	9	8	1000	2.6390	0.4970	977.5971	167	25
4	12	1967	3.	6	3	1000	2.6390	0.4970	977.5965	176	26
4	12	1967	3.	6	2	1200	2.6390	0.4970	977.5965	182	27
5	12	1967	3.	2	6	1200	2.6390	0.4970	977.5959	188	28
5	12	1967	3.	7	8	1000	2.6390	0.4970	977.5959	190	29
5	12	1967	3.	1	1	1200	2.6390	0.4970	977.5959	197	30
5	12	1967	3.	3	9	1400	2.6390	0.4970	977.5959	198	31
6	12	1967	4.	10	1	1400	2.6400	0.4970	977.5952	201	32
7	12	1967	4.	7	9	1400	2.6400	0.4970	977.5946	211	33
7	12	1967	4.	3	7	1100	2.6400	0.4970	977.5946	218	34
8	12	1967	4.	2	6	1100	2.6410	0.4970	977.5964	221	35
8	12	1967	4.	4	5	1300	2.6410	0.4970	977.5964	223	36
8	12	1967	4.	1	2	1400	2.6410	0.4970	977.5964	227	37
8	12	1967	4.	4	2	1800	2.6410	0.4970	977.5964	228	38
9	12	1967	4.	1	2	1800	2.6420	0.4970	977.5982	232	39

9	12	1967	4.	5	6	1600	2.6420	0.4970	977.5982	233	40
9	12	1967	4.	2	7	2000	2.6420	0.4970	977.5982	238	41
9	12	1967	4.	1	8	1700	2.6420	0.4970	977.5982	240	42
9	12	1967	4.	3	6	2000	2.6420	0.4970	977.5982	241	43
9	12	1967	4.	2	8	1800	2.6420	0.4970	977.5982	244	44
9	12	1967	4.	1	5	2000	2.6420	0.4970	977.5982	246	45
10	12	1967	4.	3	8	2000	2.6430	0.4970	977.6002	247	46
10	12	1967	4.	4	5	1800	2.6430	0.4970	977.6002	250	47
10	12	1967	4.	2	4	2000	2.6430	0.4970	977.6002	254	48
10	12	1967	4.	2	1	2200	2.6430	0.4970	977.6002	256	49
11	12	1967	4.	9	1	2200	2.6440	0.4970	977.6019	258	50
11	12	1967	4.	1	9	2400	2.6440	0.4970	977.6019	267	51
12	12	1967	4.	7	8	2400	2.6460	0.4970	977.6037	268	52
12	12	1967	4.	3	8	2600	2.6460	0.4970	977.6037	275	53
13	12	1967	5.	1	6	2600	2.6470	0.4970	977.6055	278	54
13	12	1967	5.	7	3	2800	2.6470	0.4970	977.6055	279	55
14	12	1967	5.	13	6	2800	2.6480	0.4970	977.6074	286	56
15	12	1967	5.	1	7	2800	2.6490	0.4970	977.6092	299	57
15	12	1967	5.	2	7	3000	2.6490	0.4970	977.6092	300	58
0	0	0	0.	0	0	0	0.0000	0.0000	0.0000	302	59

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ONE WORD INTEGERS
*LISTALL
*ARITHMETICTRACE
*TRANSFERTRACE
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
C NAGS1
C PROGRAM NAGS1 TO PROJECT GRAV STARTING FROM GRAV STORED ON DISK
C ISNEL=0 IF DATA ARE CHART READINGS, ISNEL NON ZERO IF DATA ARE FREE
C AIR GRAVITY ANOMALIES.
C FOR SSPR,SSPU,SSPL NON ZERO RESPECTIVELY, THE PROJECTED OUTPUT IS
C PRINTED, PUNCHED OR PLOTTED.
C     ANGLE IS ANGLE WHICH POSITIVE DIRECTION OF PROJECTED PROFILE
C     MAKES WITH NORTH TAKEN CLOCKWISE FROM NORTH (0 TO 360)
C     XMIN IS STARTING DISTANCE IN MILES OF ORIGINAL NAVIGATION AT WHICH
C     PROJECTION STARTS. XMAX IS FINAL DISTANCE AT WHICH PROJECTION STOPS
C VLAT AND VLON ARE LAT AND LONG OF ORIGIN OF PROJECTED PROFILE
C     IS2=0 IFAVERAGE SHIP COURSE MAKES ACUTE ANGLE WITH PROJECTED DIRECTION
C     OTHERWISE IT IS =1
C     NEOT=0FOR REG. EOTVOS, NON ZERO FOR DRIFT EOTVOS
C CAN BE USED ONLY IF DRIFT EOTVOS HAS BEEN STORED ON DISK.
C XKM,ZINCH,XSCAL,ZSCAL,FAC ARE ONLY READ IF SSPL IS NONZERO
C PRINTED AND PUNCHED PUTPUT CONSIST OF PROJECTED DISTANCE IN KM AND
C FREE AIR ANOMALY IN TENTHS OF MGAL
C THE ORIGIN OF THE PLOT IS MOVED FROM THE PEN POSITION BY ZINCH INCHES
C TOWARDS THE POSITIVE Y DIRECTION AND XKM KMS(SCALED TO INCHES) IN THE
C POSITIVE X DIRECTION.
C XSCAL AND ZSCAL GIVE X AND Y SCALES (KMS PER INCH).
C Y SCALE IS FURTHER REDUCED BY THE FACTOR FAC.
C IF FAC = 0, PROGRAM SETS = 1.
C NOTE THAT TENTHS OF MGALS USUALLY REQUIRES FAC=10 UNLESS ZSCAL HAS
C BEEN ADJUSTED.
C PRINTED AND PUNCHED ANSWERS AT FORMAT(1H 6(F7.1,I6))
C IF NO. OF OUTPUT POINTS IS EVEN MULTIPLE OF SIX LAST PRINTED LINE OR
C PUNCHED CARD IS REPEATED.
C USE PROGRAM PTROJ TO PLOT PUNCHED OUTPUT OF NAGS1 IF SEPARATE PLOTTING
C IS DESIRED.  PTROJ IS NOT GIVEN AS A PART OF THIS SYSTEM.
C CONSIDERING THE ORIGIN TO BE AT XKM AND ZINCH,
C TICK MARKS EXTEND 3 INCHES BELOW ORIGIN TO 5 INCHES ABOVE ORIGIN AND
C TO 0.1 INCHES IN THE + X DIRECTION
C     PROG WILL START FROM DAY NUMBER KS+1
C     NEW DATA CAN BE LOADED IF SAME LEG
C AFTER PLOT PEN GOES TO XNEXT INCHES BEYOND PLOT ORIGIN (NOT PEN
C ORIGIN)
C HOWEVER IF XNEXT=0, PROGRAM AUTOMATICALLY SETS IT= -XKM/SCALE SO THAT
```

```
C PEN RETURNS TO PEN ORIGIN
C PROGRAM DOES NOT EXIT BUT GOES BACK TO START TO LOAD NEW DATA.
      DEFINE FILE 4(14400,3,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 10(500,15,U,INXT)
      DEFINE FILE 11(1500,18,U,INXT)
      DIMENSION AM(12),AY(11),THR(9),TMIN(9),G(9),JTIM(9),JG(9)
      COMMON AM,AY
  293 CALL AMAY
      KS=0
      IND1=0
      KB=1
    8 READ(8,702)ANGLE,XMIN,XMAX,VLAT,VLON,IS2,NEOT,SSPR,SSPU,SSPL,KS
      IF(SSPL)200,20,200
  200 READ(8,703)XKM,ZINCH,XSCAL,ZSCAL,FAC,XNEXT,ISNEL
      CALL SCALF(1.0, 1.0,0.0,0.0)
   20 READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SET1,TZ
      XXE=0.
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SET2,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      DEN=(PLAT2-PLAT1)/DELT
      DEM=DELON(PLNG2-PLNG1)/DELT
      IF(NEOT)1,2,1
    1 KAZM=SET1/10.
      SET1=(SET1-KAZM*10.)*SIN(KAZM/57.29578)
      EOT=.0075*SET1*FCOS((PLAT1+PLAT2)/114.59156)
      GO TO 3
    2 EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
    3 FOT=1000.*EOT
      GO TO(402,2221),KB
  402 KS=KS+1
      READ(10'KS)JDAY,MON,JYR,TZ,LB,LC,JDIAL,DRR,CF,GZ,KT
      KB=2
      IF(JDAY)6,6,85
   85 L=0
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
      DIAL=JDIAL
      GZ=GZ+DIAL*CF*.001
      DRR=DRR*CF
```

```
 221 KT=KT+1
     READ(11'KT)(JTIM(I),JG(I),I=1,9)
     DO 2399 I=1,9
     JJHR=JTIM(I)/100
     THR(I)=JJHR
     G(I)=JG(I)
2399 TMIN(I)=JTIM(I)-JJHR*100
     J=0
     L=L+1
     IF(L-LB)2216,2217,2217
2216 LE=9
     GO TO 222
2217 LE=LC
 222 J=J+1
     TTT=AA+THR(J)+TMIN(J)/60.
2221 IF(TTT-TNAV2)2251,223,225
2251 IF(TTT-TNAV1)20,223,223
 223 GLAT=PLAT1+(TTT-TNAV1)*DEN
     GLONG=PLNG1+(TTT-TNAV1)*DEM
     GLONG=DELON(GLONG)
     GDIS=DISA+SPEED*(TTT-TNAV1)
     GDISK=GDIS*1.85325
     RLAT=GLAT/57.29578
     FI=978.049*(1.0052825-.0052884*
    1 (FCOS(RLAT)**2)+0.0000059*(FCOS(2.*RLAT)**2))
     IF(ISNEL)631,632,631
 631 IF(G(J)-500.)1000,1001,1001
1001 G(J)=G(J)-1000.
1000 FA=G(J)
     GRAV=FI+FA/1000.
     GO TO 634
 632 GRAV=GZ+DRR*G(J)*.001+EOT
     FA=(GRAV-FI)*1000.
 634 LGG=THR(J)*100.+TMIN(J)
     JDM=(JDAY*1000)+MON
     CALL TRCJ2(GLAT,GLONG,GDIS,FA,IND1,ANGLE,XMIN,XMAX,VLAT,VLON,IS2,
    1  XKM,ZINCH,XSCAL,ZSCAL,FAC,SSPR,SSPU,SSPL)
     GO TO (18,6),IND1
  18 IF(J-LE)222,26,26
  26 IF(L-LB)221,402,402
 225 DISA=DISB
     PLAT1=PLAT2
     PLNG1=PLNG2
     SET1=SET2
     TNAV1=TNAV2
     M=M+1
     GO TO 9973
   6  WRITE(1,712)
 712 FORMAT(' LOAD NEW DATA  '/'  ADJUST PEN  ')
     IF(SSPL)201,21,201
 201 A1=XKM/XSCAL
```

```
      A2=A1+0.1
      DO 2011 JQJ=1,9
      XJQJ=JQJ
      HT=ZINCH-4.+XJQJ
      CALL FPLOT(1,A1,HT)
      CALL FPLOT(-2,A1 ,HT)
      CALL FPLOT(-2,A2 ,HT)
 2011 CALL FPLOT( 1,A2 ,HT)
      IF(XNEXT)2012,2013,2012
 2012 XNEXT=-XKM/XSCAL
 2013 CALL FPLOT(1,XNEXT,0.0)
   21 PAUSE
      GO TO 293
  702 FORMAT(5F10.5,2I5,3F5.0,I5)
  703 FORMAT(6F10.5,I5)
  706 FORMAT(I3,I3,I5,F7.3,F8.3,F7.1,F8.1,6XF9.4,F9.4,F6.1,A4,F5.1)
  709 FORMAT(I2,I3,I5,F5.0,1X,I2,I2,I5,F6.3,F7.4,F9.4)
  710 FORMAT(9(F2.0,F2.0,F3.0,1X))
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2    THR(R )=0034-0024  TMIN(R )=0046-0036      G(R )=0058-0048 ANGLE(R )=005A
   XMIN(R )=005C        XMAX(R )=005E        VLAT(R )=0060       VLON(R )=0062        SSPR(R )=0064        SSPU(R )=0066
   SSPL(R )=0068         XKM(R )=006A       ZINCH(R )=006C      XSCAL(R )=006E       ZSCAL(R )=0070         FAC(R )=0072
  XNEXT(R )=0074        DISA(R )=0076        DMAX(R )=0078      CRUIS(R )=007A       TNAV1(R )=007C       PLAT1(R )=007E
  PLNG1(R )=0080        SET1(R )=0082          TZ(R )=0084        XXE(R )=0086         XXN(R )=0088         XXD(R )=008A
  TNAV2(R )=008C       PLAT2(R )=008E       PLNG2(R )=0090       SET2(R )=0092       DISB(R )=0094        DELT(R )=0096
  SPEED(R )=0098         DEN(R )=009A         DEM(R )=009C        EOT(R )=009E        FOT(R )=00A0         DRR(R )=00A2
     CF(R )=00A4          GZ(R )=00A6          AA(R )=00A8       DIAL(R )=00AA        TTT(R )=00AC        GLAT(R )=00AE
  GLONG(R )=00B0        GDIS(R )=00B2       GDISK(R )=00B4       RLAT(R )=00B6         FI(R )=00B8          FA(R )=00BA
   GRAV(R )=00BC          A1(R )=00BE          A2(R )=00C0       XJQJ(R )=00C2         HT(R )=00C4        JTIM(I )=00D2-00CA
     JG(I )=00DB-00D3   INXT(I )=00DC          KS(I )=00DD       IND1(I )=00DE         KB(I )=00DF         IS2(I )=00E0
   NEOT(I )=00E1       ISNEL(I )=00E2           I(I )=00E3      JBSYR(I )=00E4          M(I )=00E5        KAZM(I )=00E6
   JDAY(I )=00E7         MON(I )=00E8         JYR(I )=00E9          LB(I )=00EA         LC(I )=00EB       JDIAL(I )=00EC
     KT(I )=00ED           L(I )=00EE        JJHR(I )=00EF           J(I )=00F0         LE(I )=00F1         LGG(I )=00F2
    JDM(I )=00F3         JQJ(I )=00F4

UNREFERENCED STATEMENTS
 8        706      709      710

STATEMENT ALLOCATIONS
 712  =012B  702  =013E  703  =0146  706  =014A  709  =0158  710  =0164  293  =0184  8    =0192  200  =01B0  20   =01C7
 7002 =01DB  7001 =01E2  7003 =01E6  9973 =0203  1    =0245  2    =027A  3    =0291  402  =029C  85   =02C4  221  =02E6
 2399 =0327  2216 =0351  2217 =0357  222  =035B  2221 =0374  2251 =037D  223  =0384  631  =03D6  1001 =03E2  1000 =03ED
 632  =0400  634  =0419  18   =044A  26   =0451  225  =045A  6    =0476  201  =047F  2011 =04B5  2012 =04C8  2013 =04CF
 21   =04D4

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS
```

```
CALLED SUBPROGRAMS
 AMAY    SCALF   COMDI   DELON   FSIN    FCOS    TXX     TROJ2   FPLOT   FADDX   FSUB    FMPY    FMPYX   FDIV    FLD
 FLDX    FSTO    FSBR    FAXI    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   CARDZ   WCHRI
 READZ   SRED    SWRT    SCOMP   SFIO    SIOF    SIOI    SUBSC   PRNZ    PAUSE   SNR     SDFIO   SDRED   SDIX    SDF
 SDI

REAL CONSTANTS
  .100000E 01=00F8    .000000E 00=00FA    .100000E 02=00FC    .572957E 02=00FE    .750000E-02=0100    .114591E 03=0102
  .100000E 04=0104    .100000E-02=0106    .600000E 02=0108    .185325E 01=010A    .978049E 03=010C    .100528E 01=010E
  .528840E-02=0110    .590000E-05=0112    .200000E 01=0114    .500000E 03=0116    .100000E 03=0118    .100000E 00=011A
  .400000E 01=011C

INTEGER CONSTANTS
     0=011E      1=011F      8=0120      3=0121   1959=0122   1970=0123      2=0124     10=0125     11=0126      9=0127
   100=0128   1000=0129      0=012A

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    248  PROGRAM    992

 END OF COMPILATION
```


CONTROL CARDS AND INPUT

```
// JOB    2005 3005
// XEQ NAGS1    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)  .
       60.     3700.     4100.      12.6     -58.8    1    0   1.   1.   1.    0
      100.       11.       50.      500.        0.        0.    0
```

OUTPUT

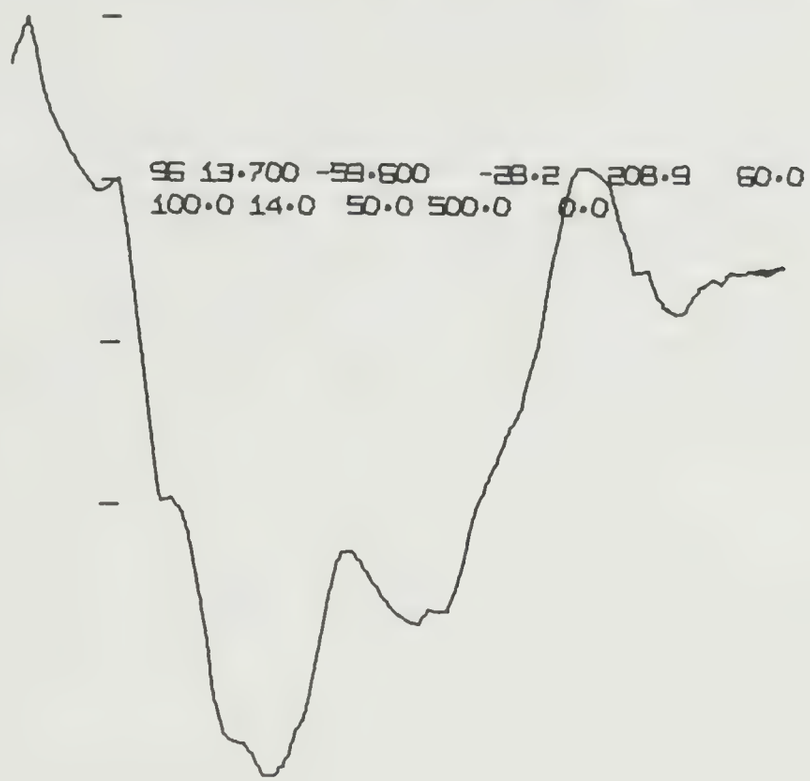
```
NO.POINTS=  145M.LAT=  12.600M.LONG=  -58.800XMIN=  -53.4XMAX=  416.9AZM=   60.
  -53.4  -435  -51.9  -455  -51.2  -478  -49.0  -507  -48.2  -491  -47.5  -473
  -43.2  -299  -42.5  -375  -41.1  -572  -39.7  -539  -39.2  -642  -38.3  -855
  -36.2  -953  -34.1  -987  -31.9  -914  -29.8  -827  -27.6  -784  -25.4  -712
  -23.3  -678  -20.0  -686  -18.5  -671  -15.5  -643  -12.5  -585   -9.4  -537
   -6.2  -455   -2.9  -358    0.2  -277    3.4  -196    6.7  -128    9.9   -73
   13.2   -28   16.4    26   19.7    41   22.9    57   26.1    51   29.6    83
   33.0   111   36.4   109   39.9   140   43.3   181   46.7   184   50.2   186
   53.6   205   57.1   194   60.5   170   64.0   174   67.4   150   70.9   126
   73.1   115   77.9   117   80.2   109   82.9   100   85.5    68   87.3    43
  109.9  -618  113.0  -649  114.3  -649  115.5  -660  118.1  -646  119.3  -657
  123.1  -683  126.9  -667  130.8  -653  134.6  -610  138.4  -583  142.2  -554
  146.0  -541  149.8  -526  153.6  -510  154.8  -523  156.0  -521  164.5  -504
  167.0  -488  168.3  -488  172.0  -485  175.7  -473  179.3  -472  183.0  -469
  186.6  -467  190.3  -465  193.9  -434  197.5  -445  201.2  -429  204.8  -440
  208.4  -438  212.0  -435  215.7  -433  219.3  -432  222.9  -443  226.6  -433
  230.2  -417  233.9  -415  237.5  -418  241.1  -416  244.7  -413  248.3  -416
  251.8  -401  255.5  -385  258.8  -397  262.3  -395  265.8  -395  272.9  -430
```

276.4	-416	279.9	-415	283.4	-426	287.0	-435	290.5	-421	294.0	-445
297.6	-456	301.1	-465	304.6	-462	308.2	-485	310.5	-483	315.8	-438
317.1	-435	318.7	-433	320.3	-424	321.9	-433	323.5	-444	325.1	-441
327.5	-422	329.8	-419	333.3	-430	336.7	-428	340.2	-439	343.7	-422
347.1	-433	350.6	-430	354.1	-441	357.9	-429	360.9	-427	364.3	-411
367.8	-408	371.2	-393	374.6	-389	378.1	-374	381.5	-372	384.9	-382
388.4	-379	391.8	-374	395.2	-385	398.7	-410	400.5	-434	402.1	-444
416.9	-384										

CONTROL CARDS AND INPUT

```
//.JOB     2005 3005
// XEQ NAGS1     1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
       60.      4070.      4300.       13.7      -59.6     0     0   1.   1.   1.     0
      100.        14.        50.      500.         0.         0.    0
```

```
NO.POINTS=   96M.LAT=  13.700M.LONG=  -59.600XMIN=  -28.2XMAX=  208.9AZM=   60.
  -28.2  -146  -27.1  -112  -25.0   -58  -22.8    -3  -20.7  -104  -18.6  -208
  -16.4  -273  -14.3  -323  -11.1  -393   -7.8  -447   -4.6  -502   -1.4  -533
    1.8  -521    5.1  -496    7.3  -640    9.5  -809   11.7 -1004   17.3 -1441
   18.4 -1485   21.7 -1477   25.0 -1520   27.2 -1586   29.4 -1717   32.7 -1911
   34.9 -2080   38.2 -2204   41.4 -2231   44.4 -2233   47.5 -2276   50.5 -2335
   53.6 -2337   56.6 -2301   58.6 -2260   60.7 -2191   62.6 -2164   64.5 -2084
   66.4 -1977   68.3 -1872   70.1 -1787   72.0 -1694   73.9 -1639   76.8 -1633
   79.8 -1674   82.6 -1717   85.5 -1761   88.6 -1806   91.6 -1834   94.6 -1853
   97.7 -1866  100.6 -1822  103.6 -1827  106.6 -1818  109.6 -1738  111.6 -1671
  113.6 -1563  115.6 -1497  117.6 -1457  119.6 -1402  121.7 -1362  123.7 -1309
  125.7 -1257  127.7 -1228  128.7 -1193  129.7 -1140  131.7 -1071  133.7 -1004
  135.8  -882  137.8  -750  139.9  -672  141.9  -567  144.0  -485  146.1  -458
  149.2  -461  152.4  -479  155.5  -509  158.6  -620  161.7  -717  162.7  -780
  164.7  -777  167.6  -769  170.5  -854  173.3  -888  176.1  -906  178.9  -897
  181.7  -850  184.5  -814  187.3  -793  190.1  -811  192.9  -776  195.7  -781
  198.5  -771  201.2  -773  203.8  -778  206.5  -767  208.2  -754  208.9  -762
  198.5  -771  201.2  -773  203.8  -778  206.5  -767  208.2  -754  208.9  -762
```



OUTPUT

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
C METC2 WITH LINK TO METC3
C ADDITIONAL SUBROUTINES MERT2, TOPT
C THIS PROGRAM IS SIMILAR TO METC8-METC9 EXCEPT THAT IT DOES NOT PLOT
C EVERY SOUNDING. (SEE METC8-METC9 FOR DESCRIPTION OF INPUT)
C INSTEAD IT MAKES TICK MARKS WHENEVER THE DEPTH IS A MULTIPLE
C OF INT(OBTAINED BY INTERPOLATION).
C IT MAKES AN ANNOTATION WHENEVER THE DEPTH IS A MULTIPLE OF 10 X INT.
C IT MAKES ADDITIONAL ANNOTATION AS FOLLOWS.
C FOR EXAMPLE IF INT=50, AND THE INTERPOLATED DEPTHS ARE 1450,1500,1550,
C 1600,1650,1650,1700,1750,1800,1850,1900,1950,2000,2050, THE REGULAR
C ANNOTATIONS ARE AT 1500 AND 2000.
C IN ADDITON THE SECOND TIME ANY INTERPOLATED SOUNDING IS REPEATED, THAT
C IS, THE SECOND 1650 IS ANNOTATED.
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      READ(8,700)WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG,JG
  700 FORMAT(5F10.1,4I5)
      CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      IF(JG)901,902,901
  901 CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
      CALL FPLOT(1,0.0,0.0)
  902 CALL LINK(METC3)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88       IGRI(I )=0000       IMIN(I )=0001        IGG(I )=0002         JG(I )=0003

STATEMENT ALLOCATIONS
 700  =0008  901  =0047  902  =0056

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   FPLOT   FLD     FSTO    TYPEZ   SIIF    CARDZ   WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ
 SDFIO

REAL CONSTANTS
  .000000E 00=0004
```

```
INTEGER CONSTANTS
     8=0006       1=0007

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES      4  PROGRAM     86

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
C METC3
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 12(500,11,U,INXT)
      DEFINE FILE 13(2500,16,U,INXT)
      DEFINE FILE 14(3536,1,U,INXT)
      DIMENSION THR(9),TMIN(9),G(9),V(68),KV(68),JTIM(8),JG(8)
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      CALL AMAY
      JPRE=0
      NCT=1
      IND1=0
      KB=1
      READ(8,703)SIZE,IOUT,IOTHR,NEWGR,ITP,INT
  703 FORMAT(F10.5,5I5)
      JP1=1
      JP2=2
      XA=0
      YA=0
      FAA=0
      XB=0
      YB=0
      FAB=0
       NMZPR=0
       KS=0
```

```
    9 IF(IOTHR)90,20,90
   90 READ(8,100)GLAT,GLONG,IGGG,IGMC
  100 FORMAT(12X,F8.3,F10.3,18X,I7,7X,I8)
      GO TO 9002
   20 READ(3'1)DISA ,I,DMAX,CRUIS,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
      XXE=0.
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      DEN=(PLAT2-PLAT1)/DELT
      DEM=DELON(PLNG2-PLNG1)/DELT
      EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
      FOT=1000.*EOT
 6000 GO TO (402,2221),KB
  402 KS=KS+1
      READ (12'KS)JDAY,MON,JYR,TZ,LB,LC,NMZ,KT
      IF(JDAY)6,6,4021
 4021 IF(NMZ-NMZPR)601,602,601
  601 DO 603 NQQ=1,68
      KNQQ=(NMZ-1)*68+NQQ
      READ(14'KNQQ)KV(NQQ)
  603 V(NQQ)=KV(NQQ)
      NMZPR=NMZ
  602 CONTINUE
      KB=2
   85 L=0
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
  221 KT=KT+1
      READ(13'KT)(JTIM(I),JG(I),I=1,8)
      DO 2399 I=1,8
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
      J=0
      L=L+1
      IF(L-LB)2216,2217,2217
 2216 LE=8
      GO TO 222
 2217 LE=LC
  222 J=J+1
      TTT=AA+THR(J)+TMIN(J)/60.
 2221 IF(TTT-TNAV2)2251,2251,225
 2251 IF(TTT-TNAV1)20,223,223
```

```
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
      LGG=THR(J)*100.+TMIN(J)
      I=1
 3330 X=I*100
      IF(G(J)-X)3331,3331,3332
 3332 I=I+1
      GO TO 3330
 3331 IF(I-1)3333,3334,3333
 3334 GGC=G(J)*V(I)/800.+3.
      GO TO 3335
 3333 IF(V(I))3338,3339,3338
 3338 GGC=G(J)*(V(I)+(G(J)-X)*(V(I)-V(I-1))/100.)/800.+3.
       GO TO 3335
 3339 GGC=(G(J)*850./800.)+3.
      WRITE(5,752)
 3335 IGMC=GGC*1.829+.5
      IGGC=GGC+.5
      LGG=THR(J)*100.+TMIN(J)
      IGGG=G(J)
 9002 IF(ITP)9001,9000,9001
 9000 FA=IGGG
      GO TO 91
 9001 FA=IGMC
   91 CALL       MERT2(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,SIZE,
     1  XA,YA,FAA,XB,YB,FAB,INDEX,   NCT,INT,JPRE,JP1,JP2)
   92 IF(IOTHR)90,18,90
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,402,402
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      M=M+1
      GO TO 9973
    6 IF(NEWGR)61,60,61
   60 CALL FPLOT(1,0.,0.)
      GO TO 62
   61 X=(ELONG-WLONG)*SCALE+6.
      CALL FPLOT(1,X,0.0)
      CALL LINK(METC2)
   62 CALL EXIT
  708 FORMAT(I5)
  909 FORMAT(I2,I3,I5,F6.1,I5,I2)
  910 FORMAT (8(F2.0,F2.0,F5.0,1X))
  911 FORMAT(20(F3.0,1X))
  752 FORMAT(47H 850 KM/SEC ASSUMED...MATHEW ZONE NOT INCLUDED )
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
```

```
  SLAT(RC)=7E8A      ANLAT(RC)=7E88        THR(R )=0034-0024  TMIN(R )=0046-0036     G(R )=0058-0048     V(R )=00E0-005A
  SIZE(R )=00E2         XA(R )=00E4         YA(R )=00E6        FAA(R )=00E8         XB(R )=00EA         YB(R )=00EC
   FAB(R )=00EE       GLAT(R )=00F0      GLONG(R )=00F2       DISA(R )=00F4       DMAX(R )=00F6      CRUIS(R )=00F8
 TNAV1(R )=00FA      PLAT1(R )=00FC      PLNG1(R )=00FE       SETE(R )=0100         TZ(R )=0102        XXE(R )=0104
   XXN(R )=0106        XXD(R )=0108      TNAV2(R )=010A      PLAT2(R )=010C      PLNG2(R )=010E       DISB(R )=0110
  DELT(R )=0112      SPEED(R )=0114        DEN(R )=0116        DEM(R )=0118        EOT(R )=011A        FOT(R )=011C
    AA(R )=011E        TTT(R )=0120       GDIS(R )=0122      GDISK(R )=0124          X(R )=0126        GGC(R )=0128
    FA(R )=012A         KV(I )=0173-0130  JTIM(I )=017B-0174    JG(I )=0183-017C  INXT(I )=0184       JPRE(I )=0185
   NCT(I )=0186       IND1(I )=0187         KB(I )=0188       IOUT(I )=0189      IOTHR(I )=018A      NEWGR(I )=018B
   ITP(I )=018C        INT(I )=018D        JP1(I )=018E        JP2(I )=018F      NMZPR(I )=0190         KS(I )=0191
  IGGG(I )=0192       IGMC(I )=0193          I(I )=0194      JBSYR(I )=0195          M(I )=0196       JDAY(I )=0197
   MON(I )=0198        JYR(I )=0199         LB(I )=019A         LC(I )=019B       NMZ(I )=019C         KT(I )=019D
   NQQ(I )=019E       KNQQ(I )=019F          L(I )=01A0       JJHR(I )=01A1          J(I )=01A2         LE(I )=01A3
   LGG(I )=01A4       IGGC(I )=01A5      INDEX(I )=01A6

UNREFERENCED STATEMENTS
 9       6000    85      92      708     909     910     911

STATEMENT ALLOCATIONS
 703  =01D1  100  =01D5  708  =01DD  909  =01DF  910  =01E6  911  =01ED  752  =01F2  9    =0274  90   =0279  20   =0286
 7002 =029A  7001 =02A1  7003 =02A5  9973 =02C2  6000 =031C  402  =0321  4021 =033F  601  =0346  603  =035F  602  =037A
 85   =037E  221  =038B  2399 =03CC  2216 =03F6  2217 =03FC  222  =0400  2221 =0419  2251 =0420  223  =0427  3330 =0462
 3332 =0476  3331 =047E  3334 =0485  3333 =049F  3338 =04A9  3339 =04DC  3335 =04EF  9002 =0514  9000 =0519  9001 =0520
 91   =0525  92   =053C  18   =0541  26   =0548  225  =0551  6    =0569  60   =056E  61   =0575  62   =0588

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    COMDI   DELON   FCOS    TXX     MERT2   FPLOT   FADDX   FSUB    FSUBX   FMPY    FMPYX   FDIV    FLD     FLDX
 FSTO    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   CARDZ   WCHRI   READZ   SRED    SWRT
 SCOMP   SFIO    SIOF    SIOI    SUBSC   PRNZ    SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .000000E 00=01AA    .750000E-02=01AC    .114591E 03=01AE    .100000E 04=01B0    .600000E 02=01B2    .185325E 01=01B4
  .100000E 03=01B6    .800000E 03=01B8    .300000E 01=01BA    .850000E 03=01BC    .182900E 01=01BE    .500000E 00=01C0
  .600000E 01=01C2

INTEGER CONSTANTS
     0=01C4      1=01C5      8=01C6      2=01C7      3=01C8   1959=01C9   1970=01CA     12=01CB     68=01CC     14=01CD
    13=01CE    100=01CF      5=01D0

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES    426  PROGRAM    992

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*TRANSFERTRACE
*ARITHMETICTRACE
*LISTALL
*ONE WORD INTEGERS
      SUBROUTINE MERT2(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,SIZE,
     1  XA,YA,FAA,XB,YB,FAB,INDEX,   NCT,INT,JPRE,JP1,JP2)
      COMMON AM(12),AY(11),B(160)
      Y=ALATI(GLAT,SLAT,ANLAT)
      IF(Y)2,3,3
    3 X=ALONG(GLONG,WLONG,ELONG,SCALE)
      IF(X)2,4,4
    4 KFA=FA+0.1
      K=KFA/INT
      JFA=K*INT
      IF(NCT-3)17,6,6
    6 IF(KFAA-KFAB)21,21,22
   22 DO 37 K=1,100
      JBEG=JFAA-(K-1)*INT
      IF(JBEG-KFAA)39,39,37
   39 IF(JBEG-KFAB)51,51,40
   40 CALL TOPT(XA,YA,XB,YB,FAA,FAB,JBEG,INT,SIZE,JPRE,JP1,JP2)
   37 CONTINUE
      GO TO 51
   21 DO 7 K=1,100
      JBEG=JFAA+(K-1)*INT
      IF(JBEG-KFAA)7,9,9
    9 IF(JBEG-KFAB)10,51,51
   10 CALL TOPT(XA,YA,XB,YB,FAA,FAB,JBEG,INT,SIZE,JPRE,JP1,JP2)
    7 CONTINUE
   51 IF(IABS(KFAB-KFAA)-INT)17,52,52
   52 IF(IABS(KFAB-KFA )-INT)17,11,11
C   CHECK FOR HILL OR VALLEY
   11 IF(KFAB-KFAA)12,13,14
   12 IF(KFAB-KFA)15,17,17
   15 JJK=1
   18 CONTINUE
      GO TO 17
   14 IF(KFAB-KFA)17,17,19
   19 JJK=2
      GO TO 18
   13 IF(KFAB-JFAB)17,20,17
   20 JJK=3
      GO TO 18
   17 YA=YB
```

```
      XA=XB
      FAA=FAB
      JFAA=JFAB
      KFAA=KFAB
      YB=Y
      XB=X
      FAB=FA
      JFAB=JFA
      KFAB=KFA
      NCT=NCT+1
    2 RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92     Y(R )=0000          X(R )=0002        KFA(I )=0006
     K(I )=0007        JFA(I )=0008       KFAA(I )=0009       KFAB(I )=000A       JBEG(I )=000B       JFAA(I )=000C
   JJK(I )=000D       JFAB(I )=000E

STATEMENT ALLOCATIONS
 3    =006B  4    =0078  6    =0094  22   =009B  39   =00B3  40   =00BA  37   =00C8  21   =00D3  9    =00E9  10   =00F0
 7    =00FE  51   =0107  52   =0115  11   =0123  12   =012C  15   =0133  18   =0137  14   =0139  19   =0140  13   =0146
 20   =014D  17   =0153  2    =0181

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 ALATI   ALONG   TOPT    IABS    FLD     SFAR    SIAR    IFIX    SIIF    SFIF    SUBIN

REAL CONSTANTS
  .100000E 00=0010

INTEGER CONSTANTS
     3=0012      1=0013    100=0014      2=0015

CORE REQUIREMENTS FOR MERT2
 COMMON    366  VARIABLES     16  PROGRAM    372

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ARITHMETICTRACE
*TRANSFERTRACE
*LISTALL
*ONE WORD INTEGERS
      SUBROUTINE TOPT(XA,YA,XB,YB,FAA,FAB,JBEG,INT,SIZE,JPRE,JP1,JP2)
      XJ=JBEG
      SL=(XJ-FAA)/(FAB-FAA)
      X=XA+SL*(XB-XA)
      Y=YA+SL*(YB-YA)
      IF(FABS(XB-XA)-FABS(YB-YA))1,1,2
    1 JPP=JP1
      XP=X-0.02
      XP2=X+0.02
      YP=Y
      YP2=Y
    3 CALL FPLOT(-2,XP,YP)
      CALL FPLOT(-2,XP2,YP2)
      CALL FPLOT(-1,XP2,YP2)
      GO TO 4
    2 JPP=JP2
      XP=X
      XP2=X
      YP=Y-.02
      YP2=Y+.02
      GO TO 3
    4 K=JBEG/(INT*10)
      K=K*INT*10
      IF(JBEG-K)6,6,7
    6 CALL MECHA(X,Y,JBEG,JPP,SIZE)
      GO TO 8
    7 IF(JBEG-JPRE)8,9,8
    9 IF(JPP-2)10,11,12
   10 JP1=3
      GO TO 6
   11 JP2=4
      GO TO 6
   12 IF(JPP-4)13,14,14
   13 JP1=1
      GO TO 6
   14 JP2=2
      GO TO 6
    8 JPRE=JBEG
      RETURN
```

```
      END
VARIABLE ALLOCATIONS
    XJ(R )=0000          SL(R )=0002          X(R )=0004          Y(R )=0006          XP(R )=0008          XP2(R )=000A
    YP(R )=000C         YP2(R )=000E        JPP(I )=0016          K(I )=0017

STATEMENT ALLOCATIONS
 1    =008C  3    =00A4  2    =00C4  4    =00DE  6    =00FB  7    =0104  9    =010B  10   =0114  11   =011A  12   =0120
 13   =0127  14   =012D  8    =0133

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FABS    FPLOT   MECHA   FSUB    FMPY    FLD     FSTO    FSBR    FDVR    SFAR    SIAR    FLOAT   SIIF    SFIF    SUBI

REAL CONSTANTS
  .200000E-01=0018

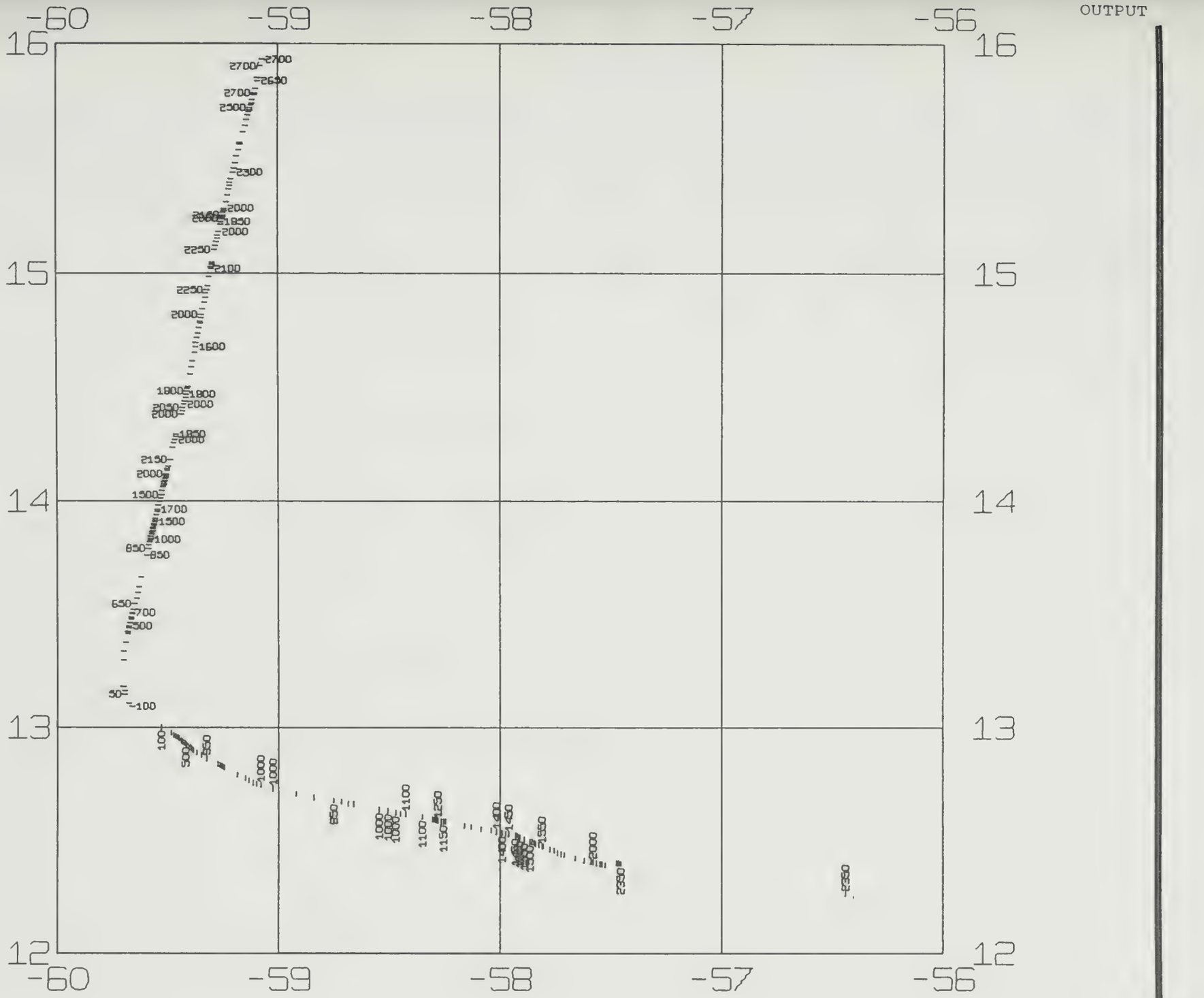
INTEGER CONSTANTS
     2=001A      1=001B     10=001C      3=001D      4=001E

CORE REQUIREMENTS FOR TOPT
 COMMON      0  VARIABLES     24  PROGRAM    290

 END OF COMPILATION
```

CONTROL CARDS AND INPUT

```
// JOB    2005 3005
// XEQ METC2    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
      -60.      -56.       12.       16.        2.    2    0    1    1
       .06    0    0    0    0   50
```


OUTPUT
-60
-59
-58
-57
-56
16
15
14
13
12

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000       -2005        2005        0000
                          3005        0001

// FOR
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
C      METC6 WITH LINK METC7 PLOTS TOPO ON MERC ALONG THE TRACK
C TOPO INPUT FROM DISK
C FOR WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG SEE MEGRW
C JG NON ZERO FOR INSIDE GRID AND ANNOTATIONS.
C FOR SCALX,YLOW,YHIGH,NSP1,NSP2,NSP3,THET, SEE MERGP
C SCALX IS NEGATIVE TO PLOT DEPTH BELOW TRACK LINE.
C THET IS READ IN DEGREES
C IOTHR NOT USED HENCE LEAVE BLANK
C PLOT IS MADE FOR POINTS BETWEEN XMIN AND XMAX N. MILES ALONG TRACK.
C IF XMAX=0, PROGRAM SETS IT=99999.
C IF IOUT IS NON ZERO PROGRAM WILL EXIT AFTER IT GOES OUT OF GRID ONCE
C NEWGR=0 IF PEN GOES BACK TO ORIGIN, NON ZERO TO GO TO NEXT GRID
C KS IS NUMBER OF DAYS SKIPPED AT BEGINNING.
C CONST IS CONSTANT SUBTRACTED FROM VALUES BEFORE PLOTTING
C ITP=0 FOR UNCORRECTED FATHOMS, NON ZERO FOR CORRECTED METERS.
C SET INT=0
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      READ(8,700)WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG,JG
  700 FORMAT(5F10.1,4I5)
      CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      IF(JG)901,902,901
  901 CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
      CALL FPLOT(1,0.0,0.0)
  902 CALL LINK(METC7)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88       IGRI(I )=0000       IMIN(I )=0001        IGG(I )=0002         JG(I )=0003

STATEMENT ALLOCATIONS
 700  =0008  901  =0047  902  =0056

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   FPLOT   FLD     FSTO    TYPEZ   SIIF    CARDZ   WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ
```

```
 SDFIO

REAL CONSTANTS
  .000000E 00=0004

INTEGER CONSTANTS
     8=0006      1=0007

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES      4  PROGRAM     86

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ONE WORD INTEGERS
*LISTALL
*ARITHMETIC TRACE
*TRANSFER TRACE
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
C METC7
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 12(500,11,U,INXT)
      DEFINE FILE 13(2500,16,U,INXT)
      DEFINE FILE 14(3536,1,U,INXT)
      DIMENSION THR(9),TMIN(9),G(9),V(68),KV(68),JTIM(8),JG(8)
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      CALL AMAY
      JPRE=0
      NCT=1
      IND1=0
      KB=1
      XFRE=0
      YFRE=0
      INDEX=1
      IX=0
      IY=0
      YYM=ALATI(ANLAT,SLAT,ANLAT)
      READ(8,703)SCALX,IOUT,IOTHR,NEWGR,ITP,INT,XMIN,XMAX,KS,YLOW,YHIGH,
```

```
    1CONST,NSP1,NSP2,NSP3,THET
 703 FORMAT(F8.5,5I5,2F8.5,I5,3F5.0,3I2,F4.0)
     THET=THET*.01745
     IF(XMAX)1301,1301,1302
1301 XMAX=99999.
     GO TO 1302
1302 CONTINUE
     JP1=1
     JP2=2
     XA=0
     YA=0
     FAA=0
     XB=0
     YB=0
     FAB=0
      NMZPR=0
      KS=0
  20 READ(3'1)DISA ,I,DMAX,CRUIS,JBSYR
     IF(JBSYR-1959)7001,7002,7002
7002 IF(JBSYR-1970)7003,7003,7001
7001 JBSYR=1959
7003 CONTINUE
     M=2
     READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
     XXE=0.
     XXN=0.
     XXD=0.
     S=0.
     IY=0
     IX=0
9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
     INDEX=1
     CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
     DISB=DISA+XXD
     DELT=TNAV2-TNAV1
     SPEED=XXD/DELT
     DEN=(PLAT2-PLAT1)/DELT
     DEM=DELON(PLNG2-PLNG1)/DELT
     EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
     FOT=1000.*EOT
6000 GO TO (402,2221),KB
 402 KS=KS+1
     READ (12'KS)JDAY,MON,JYR,TZ,LB,LC,NMZ,KT
     IF(JDAY)6,6,4021
4021 IF(NMZ-NMZPR)601,602,601
 601 DO 603 NQQ=1,68
     KNQQ=(NMZ-1)*68+NQQ
     READ(14'KNQQ)KV(NQQ)
 603 V(NQQ)=KV(NQQ)
     NMZPR=NMZ
 602 CONTINUE
     KB=2
  85 L=0
```

```
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
  221 KT=KT+1
      READ(13'KT)(JTIM(I),JG(I),I=1,8)
      DO 2399 I=1,8
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
      J=0
      L=L+1
      IF(L-LB)2216,2217,2217
 2216 LE=8
      GO TO 222
 2217 LE=LC
  222 J=J+1
      TTT=AA+THR(J)+TMIN(J)/60.
 2221 IF(TTT-TNAV2)2251,2251,225
 2251 IF(TTT-TNAV1)20,223,223
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
      LGG=THR(J)*100.+TMIN(J)
      I=1
 3330 X=I*100
      IF(G(J)-X)3331,3331,3332
 3332 I=I+1
      GO TO 3330
 3331 IF(I-1)3333,3334,3333
 3334 GGC=G(J)*V(I)/800.+3.
      GO TO 3335
 3333 IF(V(I))3338,3339,3338
 3338 GGC=G(J)*(V(I)+(G(J)-X)*(V(I)-V(I-1))/100.)/800.+3.
       GO TO 3335
 3339 GGC=(G(J)*850./800.)+3.
      WRITE(5,752)
 3335 IGMC=GGC*1.829+.5
      IGGC=GGC+.5
      LGG=THR(J)*100.+TMIN(J)
      IGGG=G(J)
 9002 IF(ITP)9001,9000,9001
 9000 FA=IGGG
      FA=FA-CONST
      GO TO 91
 9001 FA=IGMC
      FA=FA-CONST
   91 CALL MERGP(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,YYM,PLAT1,PL
     1NG1,PLAT2,PLNG2,INDEX,XXE,XXN,SCALX,YLOW,YHIGH,IX,XXD,S,NSP1,NSP2,
     2NSP3,THET)
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,402,402
  225 DISA=DISB
```

```
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      M=M+1
      GO TO 9973
    6 IF(NEWGR)61,60,61
   60 CALL FPLOT(1,0.,0.)
      GO TO 62
   61 X=(ELONG-WLONG)*SCALE+6.
      CALL FPLOT(1,X,0.0)
      CALL LINK(METC6)
   62 CALL EXIT
  708 FORMAT(I5)
  909 FORMAT(I2,I3,I5,F6.1,I5,I2)
  910 FORMAT (8(F2.0,F2.0,F5.0,1X))
  911 FORMAT(20(F3.0,1X))
  752 FORMAT(47H 850 KM/SEC ASSUMED...MATHEW ZONE NOT INCLUDED )
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88        THR(R )=0034-0024  TMIN(R )=0046-0036     G(R )=0058-0048     V(R )=00E0-005A
  XFRE(R )=00E2       YFRE(R )=00E4        YYM(R )=00E6      SCALX(R )=00E8       XMIN(R )=00EA       XMAX(R )=00EC
  YLOW(R )=00EE      YHIGH(R )=00F0      CONST(R )=00F2       THET(R )=00F4         XA(R )=00F6         YA(R )=00F8
   FAA(R )=00FA         XB(R )=00FC         YB(R )=00FE        FAB(R )=0100       DISA(R )=0102       DMAX(R )=0104
 CRUIS(R )=0106      TNAV1(R )=0108      PLAT1(R )=010A      PLNG1(R )=010C       SETE(R )=010E         TZ(R )=0110
   XXE(R )=0112        XXN(R )=0114        XXD(R )=0116          S(R )=0118      TNAV2(R )=011A      PLAT2(R )=011C
 PLNG2(R )=011E       DISB(R )=0120       DELT(R )=0122      SPEED(R )=0124        DEN(R )=0126        DEM(R )=0128
   EOT(R )=012A        FOT(R )=012C         AA(R )=012E        TTT(R )=0130       GLAT(R )=0132      GLONG(R )=0134
  GDIS(R )=0136      GDISK(R )=0138          X(R )=013A        GGC(R )=013C         FA(R )=013E         KV(I )=0187-0144
  JTIM(I )=018F-0188    JG(I )=0197-0190  INXT(I )=0198       JPRE(I )=0199        NCT(I )=019A       IND1(I )=019B
    KB(I )=019C      INDEX(I )=019D         IX(I )=019E         IY(I )=019F       IOUT(I )=01A0      IOTHR(I )=01A1
 NEWGR(I )=01A2        ITP(I )=01A3        INT(I )=01A4         KS(I )=01A5       NSP1(I )=01A6       NSP2(I )=01A7
  NSP3(I )=01A8        JP1(I )=01A9        JP2(I )=01AA      NMZPR(I )=01AB          I(I )=01AC      JBSYR(I )=01AD
     M(I )=01AE       JDAY(I )=01AF        MON(I )=01B0         JYR(I )=01B1         LB(I )=01B2         LC(I )=01B3
   NMZ(I )=01B4         KT(I )=01B5        NQQ(I )=01B6       KNQQ(I )=01B7          L(I )=01B8       JJHR(I )=01B9
     J(I )=01BA         LE(I )=01BB        LGG(I )=01BC       IGMC(I )=01BD       IGGC(I )=01BE       IGGG(I )=01BF

UNREFERENCED STATEMENTS
 6000    85      9002    18      708     909     910     911

STATEMENT ALLCCATIONS
 703  =01EF  708  =01FB  909  =01FD  910  =0204  911  =020B  752  =0210  1301 =02A0  1302 =02A6  20   =02D4  7002 =02E8
 7001 =02EF  7003 =02F3  9973 =031C  6000 =037A  402  =037F  4021 =039D  601  =03A4  603  =03BD  602  =03D8  85   =03DC
 221  =03E9  2399 =042A  2216 =0454  2217 =045A  222  =045E  2221 =0477  2251 =047E  223  =0485  3330 =04C0  3332 =04D4
 3331 =04DC  3334 =04E3  3333 =04FD  3338 =0507  3339 =053A  3335 =054D  9002 =0572  9000 =0577  9001 =0584  91   =058F
 18   =05AB  26   =05B2  225  =05BB  6    =05D3  60   =05D8  61   =05DF  62   =05F2

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS
```

```
CALLED SUBPROGRAMS
 AMAY    ALATI   COMDI   DELON   FCOS    TXX     MERGP   FPLOT   FADDX   FSUB    FSUBX   FMPY    FMPYX   FDIV    FLD
 FLDX    FSTO    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   CARDZ   WCHRI   READZ   SRED
 SWRT    SCOMP   SFIO    SIOF    SIOI    SUBSC   PRNZ    SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .174500E-01=01C4    .999990E 05=01C6    .000000E 00=01C8    .750000E-02=01CA    .114591E 03=01CC    .100000E 04=01CE
  .600000E 02=01D0    .185325E 01=01D2    .100000E 03=01D4    .800000E 03=01D6    .300000E 01=01D8    .850000E 03=01DA
  .182900E 01=01DC    .500000E 00=01DE    .600000E 01=01E0

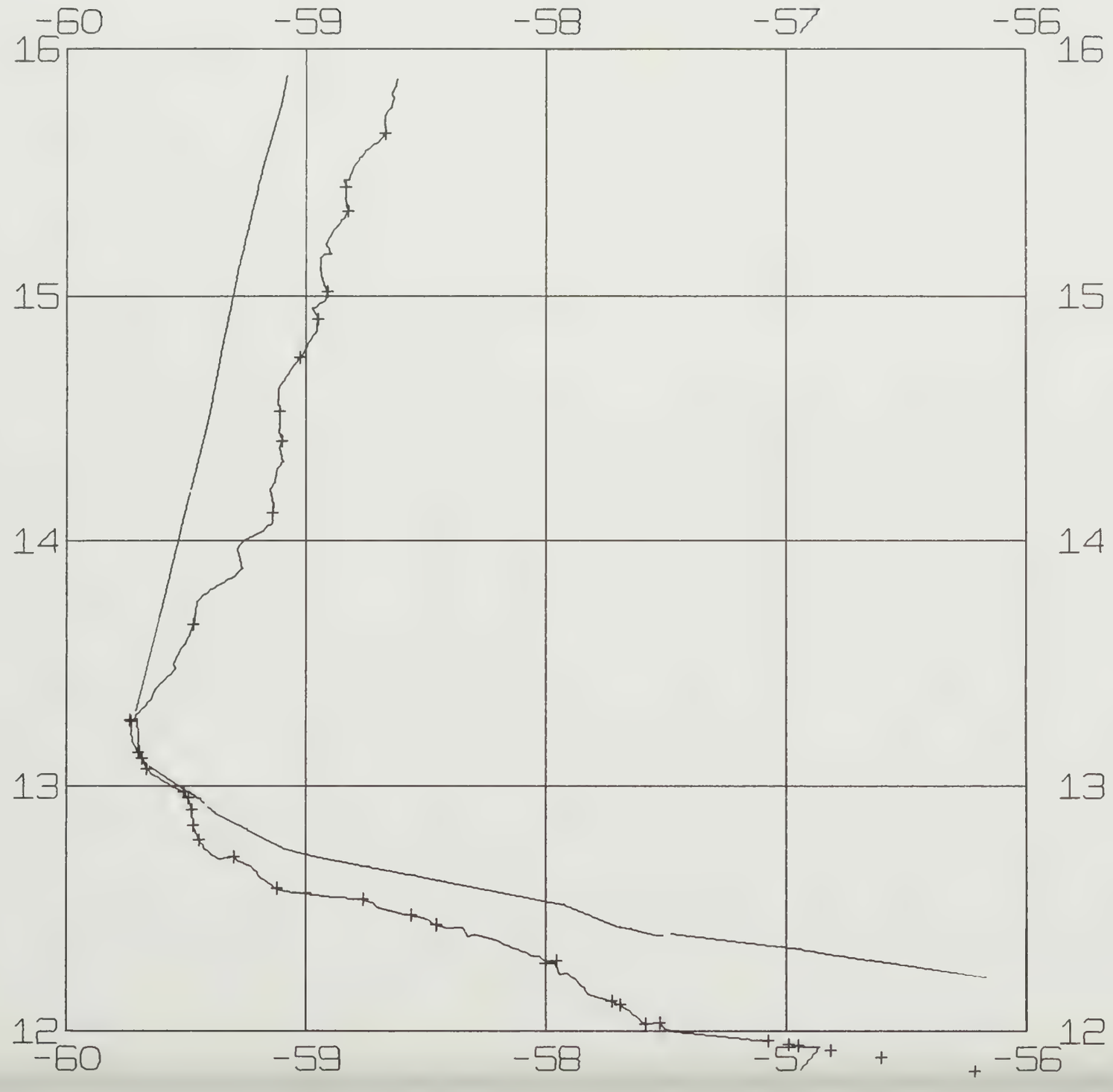
INTEGER CONSTANTS
     0=01E2      1=01E3      8=01E4      2=01E5      3=01E6   1959=01E7   1970=01E8     12=01E9     68=01EA     14=01EB
    13=01EC    100=01ED      5=01EE

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES    452  PROGRAM   1072

 END OF COMPILATION
```

CONTROL CARDS
AND INPUT

```
// JOB    2005 3005
// XEQ METC6    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
      -60.      -56.       12.       16.        2.    2    0    1    1
  -3000.    0    0    0    0    0      0.      0.    0   0.   0.   0. 0 0 0  0.
```



OUTPUT

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ONE WORD INTEGERS
*ARITHMETIC TRACE
*TRANSFER TRACE
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
C METC8
C METC8 WITH LINK TO METC9 ANNOTATES TOPO ON MERC, TOPO INPUT FROM DISK
C FOR WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG SEE MEGRW
C JG IS NON ZERO TO CALL MEGRW FOR INSIDE GRID AND ANNOTATIONS
C SIZE IS SIZE OF TOPO ANNOTATIONS
C IF IOUT IS NON ZERO PROGRAM WILL EXIT AFTER IT GOES OUT OF GRID ONCE
C IOTHR IS NON ZERO IF TOPO ANSWER CARDS ARE USED AS INPUT
C IGNORE INT
C ITP=0 FOR UNCORRECTED FATHOMS, NON ZERO FOR CORRECTED METERS.
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      READ(8,700)WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG,JG
  700 FORMAT(5F10.1,4I5)
      CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      IF(JG)901,902,901
  901 CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
      CALL FPLOT(1,0.0,0.0)
  902 CALL LINK(METC9)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88       IGRI(I )=0000       IMIN(I )=0001        IGG(I )=0002         JG(I )=0003

STATEMENT ALLOCATIONS
 700  =0008  901  =0047  902  =0056

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   FPLOT   FLD     FSTO    TYPEZ   SIIF    CARDZ   WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ
 SDFIO

REAL CONSTANTS
  .000000E 00=0004

INTEGER CONSTANTS
     8=0006      1=0007
```

```
CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES      4  PROGRAM     86

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ONE WORD INTEGERS
*LISTALL
*ARITHMETIC TRACE
*TRANSFER TRACE
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
C METC9
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 12(500,11,U,INXT)
      DEFINE FILE 13(2500,16,U,INXT)
      DEFINE FILE 14(3536,1,U,INXT)
      DIMENSION THR(9),TMIN(9),G(9),V(68),KV(68),JTIM(8),JG(8)
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      CALL AMAY
      JPRE=0
      NCT=1
      IND1=0
      KB=1
      XFRE=0
      YFRE=0
      INDEX=1
      IX=0
      IY=0
      READ(8,703)SIZE,IOUT,IOTHR,NEWGR,ITP,INT
  703 FORMAT(F10.5,5I5)
      JP1=1
      JP2=2
      XA=0
      YA=0
      FAA=0
      XB=0
      YB=0
      FAB=0
```

```
      NMZPR=0
      KS=0
    9 IF(IOTHR)90,20,90
   90 READ(8,100)GLAT,GLONG,IGGG,IGMC
  100 FORMAT(12X,F8.3,F10.3,18X,I7,7X,I8)
      GO TO 9002
   20 READ(3'1)DISA ,I,DMAX,CRUIS,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
      XXE=0.
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      DEN=(PLAT2-PLAT1)/DELT
      DEM=DELON(PLNG2-PLNG1)/DELT
      EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
      FOT=1000.*EOT
 6000 GO TO (402,2221),KB
  402 KS=KS+1
      READ (12'KS)JDAY,MON,JYR,TZ,LB,LC,NMZ,KT
      IF(JDAY)6,6,4021
 4021 IF(NMZ-NMZPR)601,602,601
  601 DO 603 NQQ=1,68
      KNQQ=(NMZ-1)*68+NQQ
      READ(14'KNQQ)KV(NQQ)
  603 V(NQQ)=KV(NQQ)
      NMZPR=NMZ
  602 CONTINUE
      KB=2
   85 L=0
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
  221 KT=KT+1
      READ(13'KT)(JTIM(I),JG(I),I=1,8)
      DO 2399 I=1,8
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
      J=0
      L=L+1
      IF(L-LB)2216,2217,2217
 2216 LE=8
      GO TO 222
 2217 LE=LC
  222 J=J+1
```

```
      TTT=AA+THR(J)+TMIN(J)/60.
 2221 IF(TTT-TNAV2)2251,2251,225
 2251 IF(TTT-TNAV1)20,223,223
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
      LGG=THR(J)*100.+TMIN(J)
      I=1
 3330 X=I*100
      IF(G(J)-X)3331,3331,3332
 3332 I=I+1
      GO TO 3330
 3331 IF(I-1)3333,3334,3333
 3334 GGC=G(J)*V(I)/800.+3.
      GO TO 3335
 3333 IF(V(I))3338,3339,3338
 3338 GGC=G(J)*(V(I)+(G(J)-X)*(V(I)-V(I-1))/100.)/800.+3.
       GO TO 3335
 3339 GGC=(G(J)*850./800.)+3.
      WRITE(5,752)
 3335 IGMC=GGC*1.829+.5
      IGGC=GGC+.5
      LGG=THR(J)*100.+TMIN(J)
      IGGG=G(J)
 9002 IF(ITP)9001,9000,9001
 9000 FA=IGGG
      GO TO 91
 9001 FA=IGMC
   91 CALL MERGR(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,SIZE,XFRE,
     1  YFRE,INDEX,IX)
   92 IF(IOTHR)90,18,90
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,402,402
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      M=M+1
      GO TO 9973
    6 IF(NEWGR)61,60,61
   60 CALL FPLOT(1,0.,0.)
      GO TO 62
   61 X=(ELONG-WLONG)*SCALE+6.
      CALL FPLOT(1,X,0.0)
      CALL LINK(METC8)
   62 CALL EXIT
  708 FORMAT(I5)
  909 FORMAT(I2,I3,I5,F6.1,I5,I2)
  910 FORMAT (8(F2.0,F2.0,F5.0,1X))
  911 FORMAT(20(F3.0,1X))
  752 FORMAT(47H 850 KM/SEC ASSUMED...MATHEW ZONE NOT INCLUDED )
```

```
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88        THR(R )=0034-0024  TMIN(R )=0046-0036     G(R )=0058-0048     V(R )=00E0-005A
  XFRE(R )=00E2       YFRE(R )=00E4       SIZE(R )=00E6         XA(R )=00E8         YA(R )=00EA        FAA(R )=00EC
    XB(R )=00EE         YB(R )=00F0        FAB(R )=00F2       GLAT(R )=00F4      GLONG(R )=00F6       DISA(R )=00F8
  DMAX(R )=00FA      CRUIS(R )=00FC      TNAV1(R )=00FE      PLAT1(R )=0100      PLNG1(R )=0102       SETE(R )=0104
    TZ(R )=0106         XXE(R )=0108        XXN(R )=010A        XXD(R )=010C      TNAV2(R )=010E      PLAT2(R )=0110
 PLNG2(R )=0112        DISB(R )=0114       DELT(R )=0116      SPEED(R )=0118        DEN(R )=011A        DEM(R )=011C
   EOT(R )=011E         FOT(R )=0120         AA(R )=0122        TTT(R )=0124       GDIS(R )=0126      GDISK(R )=0128
     X(R )=012A         GGC(R )=012C         FA(R )=012E         KV(I )=0177-0134  JTIM(I )=017F-0178    JG(I )=0187-0180
  INXT(I )=0188        JPRE(I )=0189        NCT(I )=018A       IND1(I )=018B         KB(I )=018C      INDEX(I )=018D
    IX(I )=018E         IY(I )=018F       IOUT(I )=0190      IOTHR(I )=0191      NEWGR(I )=0192        ITP(I )=0193
   INT(I )=0194         JP1(I )=0195        JP2(I )=0196      NMZPR(I )=0197         KS(I )=0198       IGGG(I )=0199
  IGMC(I )=019A          I(I )=019B      JBSYR(I )=019C          M(I )=019D       JDAY(I )=019E        MON(I )=019F
   JYR(I )=01A0         LB(I )=01A1         LC(I )=01A2        NMZ(I )=01A3         KT(I )=01A4        NQQ(I )=01A5
  KNQQ(I )=01A6          L(I )=01A7       JJHR(I )=01A8          J(I )=01A9         LE(I )=01AA        LGG(I )=01AB
  IGGC(I )=01AC

UNREFERENCED STATEMENTS
 9       6000    85      92      708     909     910     911

STATEMENT ALLOCATIONS
 703  =01D7  100  =01DB  708  =01E3  909  =01E5  910  =01EC  911  =01F3  752  =01F8  9    =0290  90   =0295  20   =02A2
 7002 =02B6  7001 =02BD  7003 =02C1  9973 =02DE  6000 =0338  402  =033D  4021 =035B  601  =0362  603  =037B  602  =0396
 85   =039A  221  =03A7  2399 =03E8  2216 =0412  2217 =0418  222  =041C  2221 =0435  2251 =043C  223  =0443  3330 =047E
 3332 =0492  3331 =049A  3334 =04A1  3333 =04BB  3338 =04C5  3339 =04F8  3335 =050B  9002 =0530  9000 =0535  9001 =053C
 91   =0541  92   =0550  18   =0555  26   =055C  225  =0565  6    =057D  60   =0582  61   =0589  62   =059C

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    COMDI   DELON   FCOS    TXX     MERGR   FPLOT   FADDX   FSUB    FSUBX   FMPY    FMPYX   FDIV    FLD     FLDX
 FSTO    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   CARDZ   WCHRI   READZ   SRED    SWRT
 SCOMP   SFIO    SIOF    SIOI    SUBSC   PRNZ    SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .000000E 00=01B0    .750000E-02=01B2    .114591E 03=01B4    .100000E 04=01B6    .600000E 02=01B8    .185325E 01=01BA
  .100000E 03=01BC    .800000E 03=01BE    .300000E 01=01C0    .850000E 03=01C2    .182900E 01=01C4    .500000E 00=01C6
  .600000E 01=01C8

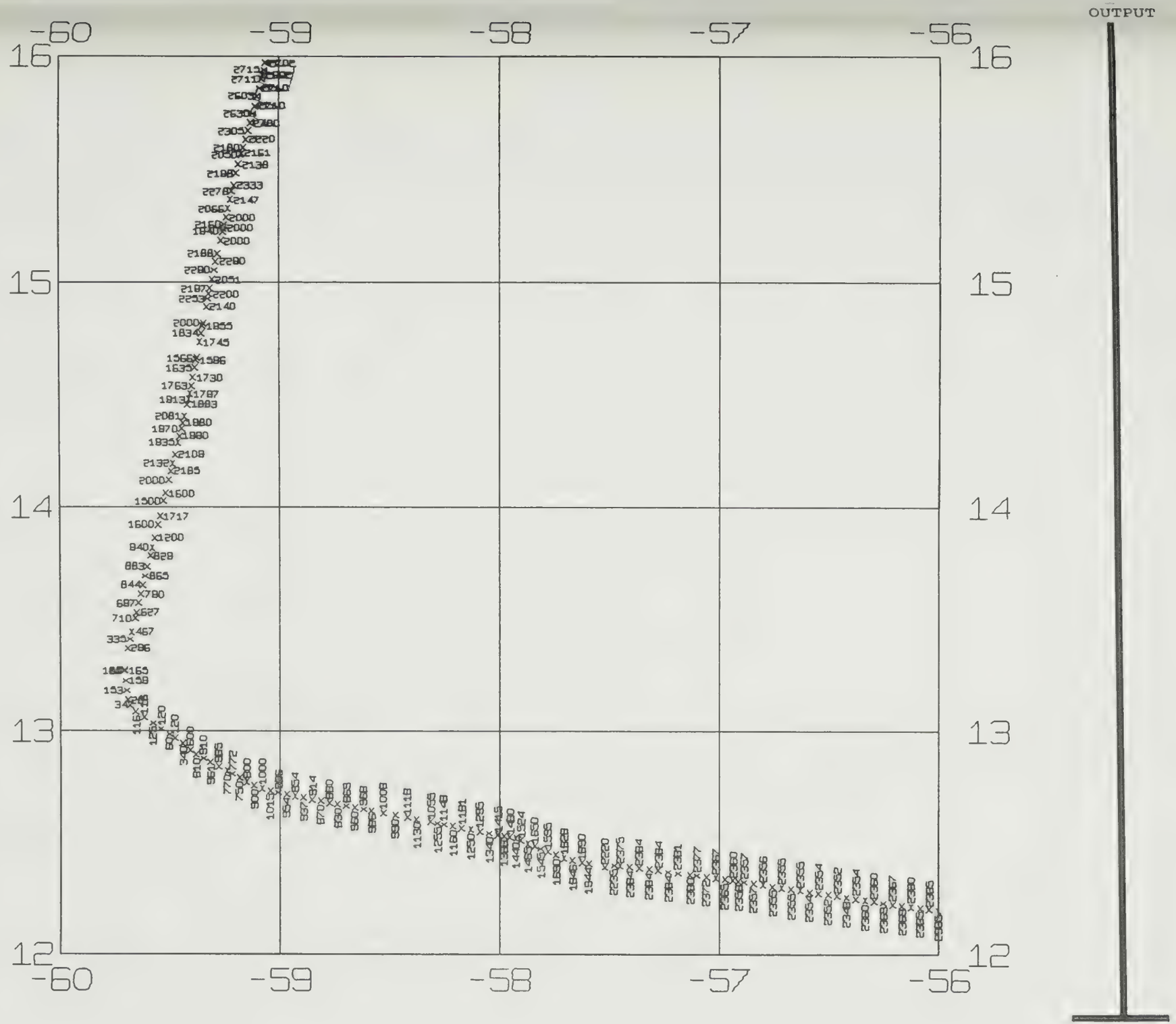
INTEGER CONSTANTS
     0=01CA      1=01CB      8=01CC      2=01CD      3=01CE   1959=01CF   1970=01D0     12=01D1     68=01D2     14=01D3
    13=01D4    100=01D5      5=01D6

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES    432  PROGRAM   1006

 END OF COMPILATION
```

```
// JOB    2005 3005
// XEQ METC8    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
      -60.       -56.        12.        16.        2.    2    0    1    1
       .06    0    0    0    0    0
```

CONTROL CARDS
AND INPUT


OUTPUT
-60
-59
-58
-57
-56
16
15
14
13
12

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*ONE WORD INTEGERS
C MMATZ
C PROGRAM TO STORE VELOCITY OF SOUND(MATTHEWS TABLES) FOR DEPTH
C CORRECTION ON DISK FOR USE IN TOPO REDUCTION PROGRAMS.
C VELOCITY OF SOUND IS PUNCHED AT FORMAT 20(I3,1X) FOR EACH HUNDRED
C FATHOMS FOR EACH ZONE IN SEQUENCE.
C 4 CARDS ARE USED FOR EACH ZONE REGARDLESS OF HOW MANY OF THESE 4
C CARDS ARE ACTUALLY PUNCHED.
      DEFINE FILE 14(3536,1,U,INXT)
      DIMENSION KV(80)
      DO 200 M=1,52
      WRITE(5,701)M
  701 FORMAT(1H ,12HMATTHEW ZONE,I3)
      READ(8,700)(KV(I),I=1,80)
  700 FORMAT(20(I3,1X))
      DO 201 I=1,68
      L=(M-1)*68+I
  201 WRITE(14'L)KV(I)
      WRITE(5,703)(KV(I),I=1,68)
  703 FORMAT(17I4)
  200 CONTINUE
      CALL EXIT
      END
VARIABLE ALLOCATIONS
    KV(I )=0057-0008  INXT(I )=0058          M(I )=0059          I(I )=005A          L(I )=005B

STATEMENT ALLOCATIONS
 701  =0065  700  =0070  703  =0075  201  =00C0  200  =00EB

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 FLD     FSTO    TYPEZ   CARDZ   WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOIX   SIOI    SUBSC   PRNZ    SDFIO
 SDWRT   SDCOM   SDIX

INTEGER CONSTANTS
     1=005E     52=005F      5=0060      8=0061     80=0062     68=0063     14=0064

CORE REQUIREMENTS FOR
 COMMON      0  VARIABLES     94  PROGRAM    152
```

END OF COMPILATION

CONTROL CARDS
AND INPUT

```
// JOB    2005 3005
// DUP
*STOREDATA  WS  UA  MATZ    12      3005
// XEQ MMATZ    1
*FILES(14,MATZ)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829 827 827 828 828 829 830 830 831 832 833 833 834 835 836 837 838 839 840 841
841 842 842 843 843 843 844 844 845 845


840 839 840 840 841 842 843 844 845 845 846 848 848 850 851 851 851 852 853 853
854 854 854 855 856 856 856 857 857 858


803 804 805 806 806 807 808 809 810 811 812 813 814 814 814 815 816 817 817 817
818 818 818 819 819 820 820 821 822 822
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OUTPUT

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MATTHEW ZONE  1
788 790 792 793 794 795 796 797 798 799 799 800 801 802 803 804 805
805 806 807 808 809 809 810 811 812 812 813 814 815 815 815 816   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE  2
799 797 797 797 797 797 798 798 799 799 800 801 802 802 803 804 804
805 806 806 807 808 808 809 810 810 810 811 812 813 813 814 814   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE  3
800 805 804 804 803 803 803 803 803 803 804 804 805 805 806 806 807
807 808 808 809 810 811 811 812 812 812 812 813 813 814 815 815   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE  4
802 802 802 803 804 804 805 806 806 807 808 809 810 811 811 812 813
814 815 816 816 817 818 819 819 820 821 821 822 822 823 824 824   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE  5
814 810 808 807 807 807 806 807 807 808 809 810 810 811 812 813 814
815 815 816 817 817 818 819 819 820 821 821 822 822 823 824 824   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE  6
807 806 806 806 806 807 807 808 809 809 810 810 811 812 812 813 814
815 816 817 818 818 819 820 821 821 822 823 823 824 824 825 826   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE  7
813 810 810 809 809 809 810 810 810 811 811 812 812 813 814 815 815
816 817 818 818 819 820 821 821 822 823 824 824 825 825 826 826   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
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MATTHEW ZONE 8

817	816	815	814	813	813	813	812	813	813	813	814	814	815	816	816	817
817	818	819	819	820	821	822	822	823	824	825	826	826	826	827	827	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 9

827	824	822	819	818	817	816	816	816	816	816	817	817	818	818	818	819
819	820	820	821	822	822	823	824	824	825	825	826	826	826	827	827	828
828	828	829	829	830	830	830	830	831	832	833	833	833	834	835	835	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 10

817	817	817	817	817	818	818	817	817	817	818	818	818	818	818	818	819
819	820	820	821	822	822	823	824	825	825	825	826	826	826	826	827	827
828	828	828	828	829	829	829	830	831	832	832	832	833	834	834	834	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 11

824	823	821	820	820	819	819	818	818	818	818	818	818	819	819	819	820
820	821	821	822	823	823	824	824	825	826	827	828	828	829	830	831	832
832	833	833	834	835	835	836	836	836	837	837	837	837	838	839	839	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 12

833	830	828	824	824	823	822	821	820	820	820	820	820	820	820	821	821
822	822	823	823	824	824	825	825	826	827	827	828	829	830	830	831	832
832	833	834	835	836	836	837	838	839	840	841	841	842	843	844	846	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 13

827	825	824	824	823	823	822	822	822	822	821	821	821	822	822	822	822
823	823	823	824	824	825	825	826	827	827	827	828	828	828	828	829	826
829	830	830	831	832	832	833	833	834	834	835	836	836	836	837	837	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 14

835	833	831	830	828	826	824	824	823	822	822	822	822	822	822	823	823
823	823	824	824	825	825	826	826	827	828	828	829	829	830	831	831	832
832	833	833	833	834	835	835	836	837	837	837	838	839	839	840	840	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 15

827	826	826	826	825	825	824	824	824	824	823	823	823	823	823	823	824
824	824	824	825	825	826	826	827	827	828	828	829	826	830	830	830	830
831	832	832	833	834	834	835	835	835	836	837	838	838	839	840	840	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 16

829	829	817	816	815	815	815	815	815	815	815	816	816	817	817	818	819
820	820	820	821	821	822	823	824	824	824	825	825	826	826	827	828	828
829	829	829	830	831	831	831	832	832	833	834	834	834	835	836	837	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 17

834	829	825	823	821	818	817	818	817	817	818	818	818	818	819	819	820
821	821	822	823	824	825	825	826	827	827	828	829	829	830	831	831	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 18

833	833	829	827	824	822	821	820	819	819	819	819	820	820	821	821	821
822	823	823	824	824	825	826	827	828	828	829	830	831	831	832	833	834
834	835	836	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 19

831	827	823	820	818	817	816	815	815	815	815	816	816	816	817	817	818
819	819	820	820	821	822	823	823	824	825	825	826	827	827	828	828	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 20

826	824	820	818	816	815	814	814	814	814	815	815	815	816	816	817	817
818	819	819	820	820	821	822	822	823	824	824	825	826	826	827	828	828
826	830	830	831	832	832	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 21

813	813	813	813	814	814	814	814	814	814	814	814	814	815	815	815	816
816	817	817	818	819	819	820	821	822	823	824	825	825	825	825	824	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 22

820	816	814	812	811	810	810	810	810	810	811	811	812	813	813	814	815
815	816	817	818	818	819	820	820	821	822	822	823	823	824	824	824	825
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 23

807	807	808	808	809	809	809	809	809	810	810	811	811	812	812	813	814
814	815	816	816	817	818	819	819	820	821	821	822	822	823	823	823	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 24

804	804	804	805	805	805	806	806	807	808	808	809	810	810	811	812	812
813	814	815	815	816	817	817	818	819	820	821	822	823	824	824	824	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 25

800	800	801	802	802	803	804	804	805	806	807	807	808	809	809	810	811
812	813	813	814	815	816	816	817	818	818	819	819	819	820	820	820	821
821	821	822	822	822	823	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 26

796	797	798	799	800	801	802	802	803	804	805	806	806	807	808	809	810
810	811	812	813	814	815	815	816	817	818	819	820	820	820	821	821	822
822	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 27

792	794	796	797	798	799	800	801	802	803	804	804	805	806	807	807	808
809	810	811	812	812	813	814	815	816	817	818	819	819	820	821	821	821
822	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 28

790	793	794	796	797	798	799	800	801	802	803	804	804	805	806	807	808
808	809	810	811	812	812	813	814	815	816	817	817	818	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 29

791	793	795	796	797	798	799	800	800	801	802	803	803	804	805	806	806
807	808	809	810	811	811	812	813	814	814	815	816	817	817	818	819	819
820	821	822	823	823	824	825	826	0	0	0	0	0	0	0	0	0

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  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 30
788 791 793 794 795 796 797 798 799 799 800 801 802 803 804 805 805
806 807 808 809 810 810 811 812 813 814 814 815 816   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 31
822 821 820 820 819 818 817 816 816 815 815 816 816 816 817 817 818
818 818 819 819 820 821 821 822 822 823 824 824 825 826 826 827 828
829   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 32
826 823 822 821 821 820 818 818 817 817 817 817 817 817 817 817 818
818 819 819 820 820 821 821 822 823 823 824 825 825 826 827 827 828
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 33
832 826 824 821 820 819 819 818 818 817 817 817 817 818 818 818 818
818 819 820 820 821 821 822 823 823 824 824 825 825 826 827 827   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 34
831 826 823 821 820 820 819 819 818 818 818 818 818 818 818 818 819
819 820 820 821 821 822 822 823 824 825 825 826 826   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 35
832 826 822 820 818 818 817 816 816 816 816 816 816 816 816 817 817
817 818 819 819 820 820 821 822 822 823 823 824 825 826 826 827 827
828 829 830   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 36
832 828 825 823 821 820 819 819 818 818 818 818 818 818 818 818 819
819 820 820 821 821 822 823 823 824 824 825 825 825 826 827 827 828
828   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 37
832 829 827 825 823 822 821 820 820 819 819 819 820 820 820 820 820
820 821 822 822 822 823 823 824 824 825 825 826 826 827 828 829 830
830 831 831 832 834 834 835   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 38
835 831 828 827 825 825 824 823 823 822 822 822 821 821 820 821 822
822 822 822 823 823 824 824 825 825 826 826 827 827   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 39
834 826 823 820 818 817 816 816 816 816 816 816 816 817 817 818 818
819 820 820 821 822 822 823 824 825 825 826 827 828 829 829 830 831
832 832 833 834 835 836 837   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 40
 835 828 826 825 824 823 824 824 825 825 826 826 827 828 828 829 830
 831 832 833 833 834 835 836 836 836 837 837 838 838
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  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 41
837 829 823 820 819 817 817 816 816 815 815 816 816 816 816 817 817
818 818 819 819 820 820 821 822 823 823 824 825 825 826 827 828 828
829 830 831 832 832 833 834 835 835 836 837 838 839 840 840 841 842
843 844 844 845   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 42
822 820 819 817 817 816 815 815 814 814 814 814 815 815 815 816 816
817 817 818 818 819 820 821 822 822 823 823 824 825 826 827 827 828
829 830 831 831 832 833 834 835 836 836 837 838 838 839 840 840 841
841 842 843 843   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 43
814 813 813 813 812 812 812 812 812 812 812 812 813 813 814 815 815
816 816 817 818 818 819 820 820 821 822 822 823 824 825 826 826 827
828 829 830 830 831 832 833 834 835 836 836 837   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 44
809 809 809 809 809 810 810 811 811 812 813 814 815 815 816 816 817
818 819 819 820 821 822 823 823 824 825 826 827 827 828 829 829 830
831 832 832 833 834 834   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 45
802 802 802 803 803 804 804 805 805 806 807 807 808 809 810 810 811
812 813 814 815 816 816 817 818 819 820 820 821 822 823 824 825 826
826 827 827 828 828 829   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 46
833 830 826 824 821 820 819 818 817 817 817 817 817 817 818 818 818
819 819 820 821 821 822 822 823 824 824 825 825 826 827 827 828 828
829 830 830 831 831 832 833 833 834 834 835 836 836 837 837   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 47
822 822 822 823 824 825 826 827 828 828 829 829 830 830 831 831 832
833 834 835 835 835 836 837 837 837 838 838 839 840 841 841 842 842
843   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 48
824 824 824 825 826 827 828 828 829 830 831 832 833 834 835 835 835
835 836 836 837 837 837 838 838 839 840 841 841 841 841 842 842 842
843   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 49
825 825 826 826 827 828 829 829 830 831 832 833 833 834 835 836 837
838 839 840 841 841 842 842 843 844 844 845 845 846   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
MATTHEW ZONE 50
829 827 827 828 828 829 830 830 831 832 833 833 834 835 836 837 838
839 840 841 841 842 842 843 843 843 844 844 845 845   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
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MATTHEW ZONE 51

840	839	840	840	841	842	843	844	845	845	846	848	848	850	851	851	851
852	853	853	854	854	854	855	856	856	856	857	857	858	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MATTHEW ZONE 52

803	804	805	806	806	807	808	809	810	811	812	813	814	814	814	815	816
817	817	817	818	818	818	819	819	820	820	821	822	822	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
*ONE WORD INTEGERS
C MTOPD
C STORES TOPOGRAPHY DATA ON DISK
C DATA CONSISTS OF DAY CARDS FOLLOWED BY DATA AS A TIME SERIES.
C JDAY,MON,JYR,TZ GIVE DAY,MONTH,YEAR,AND TIME ZONE FOR DAY CARD.
C LB IS NO. OF CARDS THAT DAY
C LC IS NO. OF POINTS LAST CARD
C NMZ IS THE NO. OF THE MATTHEWS ZONE.
C IF NMZ=0, THE MATTHEWS ZONE OF THE PREVIOUS DAY IS STORED ON DISK.
C DATA IS READ AS JHR(I),JMIN(I),JG(I) WHERE JG(I) IS DEPTH IN
C UNCORRECTED FATHOMS.
C EIGHT TIME AND DEPTH READINGS ARE PUNCHED PER CARD.
C DATA ARE STORED IN 2 FILES, ONE FILE STORES DAY CARDS(INDEX KS) AND
C THE OTHER STORES TIME AND DEPTH VALUES(INDEX KT).
C FOR MONITORING PURPOSES EACH DAY CARD IS PRINTED OUT.
C ALSO PRINTED OUT ARE KS(DAY CARD NO.) AND KT(WHERE KT+1 WILL BE INDEX
C OF NEXT TIME SERIES POINT STORED).
      DEFINE FILE 12(500,11,U,INXT)
      DEFINE FILE 13(2500,16,U,INXT)
      DIMENSION JTIM(8),JG(8),JHR(8),JMIN(8)
      KS=0
      KT=0
  204 READ(8,709)JDAY,MON,JYR,TZ,LB,LC,NMZ
  709 FORMAT(I2,I3,I5,F6.1,I5,I2,I5)
      IF(NMZ)501,501,502
  501 NMZ=NMZPR
  502 CONTINUE
      KS=KS+1
      WRITE(12'KS)JDAY,MON,JYR,TZ,LB,LC,NMZ,KT
      WRITE(5,715)JDAY,MON,JYR,TZ,LB,LC,NMZ,KT,KS
  715 FORMAT(I3,I3,I5,F6.1,I3,I3,I5,I5,I5)
      NMZPR=NMZ
      IF(JDAY)201,201,202
  202 DO 203 L=1,LB
      READ(8,710)(JHR(I),JMIN(I),JG(I),I=1,8)
  710 FORMAT(8(I2,I2,I5,1X))
      KT=KT+1
      DO 205 I=1,8
  205 JTIM(I)=JHR(I)*100+JMIN(I)
      WRITE(13'KT)(JTIM(I),JG(I),I=1,8)
  203 CONTINUE
      GO TO 204
```

```
  201 CALL EXIT
      END
VARIABLE ALLOCATIONS
    TZ(R )=000E        JTIM(I )=0017-0010    JG(I )=001F-0018   JHR(I )=0027-0020  JMIN(I )=002F-0028  INXT(I )=0030
    KS(I )=0031          KT(I )=0032        JDAY(I )=0033        MON(I )=0034        JYR(I )=0035         LB(I )=0036
    LC(I )=0037         NMZ(I )=0038       NMZPR(I )=0039          L(I )=003A          I(I )=003B

STATEMENT ALLOCATIONS
 709  =0045  715  =004D  710  =0057  204  =007F  501  =0094  502  =0098  202  =00D0  205  =00F8  203  =0128  201  =0133

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 FLD     FSTO    TYPEZ   CARDZ   WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOIX   SIOF    SIOI    SUBSC   PRNZ
 SDFIO   SDWRT   SDCOM   SDIX    SDF     SDI

INTEGER CONSTANTS
     0=003E      8=003F      1=0040     12=0041      5=0042    100=0043     13=0044

CORE REQUIREMENTS FOR
 COMMON      0  VARIABLES     62  PROGRAM    246

 END OF COMPILATION
```


CONTROL CARDS
AND INPUT

```
// JOB    2005 3005
// DUP
*STOREDATA  WS  UA  E2413    2       3005
*STOREDATA  WS  UA  F2413   19       3005
// XEQ MTOPD    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)


17 11 1967  02.0    104   19
1030 0018 1045 0020 1100 0020 1115 0025
17 11 1967  02.0    7 3
1130 0027 1145 0030 1200 0033 1215 0033 1230 0033 1245 0035 1300 0035 1315 0037
1330 0039 1345 0040 1400 0041 1415 0043 1430 0044 1445 0044 1500 0047 1515 0049
1530 0050 1545 0050 1600 0051 1615 0055 1630 0056 1645 0057 1700 0057 1715 0058
1730 0058 1745 0057 1800 0061 1815 0062 1830 0060 1845 0062 1900 0063 1915 0063
1930 0063 1945 0063 2000 0064 2015 0064 2030 0063 2045 0062 2100 0060 2115 0058
2130 0056 2145 0056 2200 0053 2215 0049 2230 0048 2245 0047 2300 0047 2315 0050
2330 0050 2345 0047 2400 0048
18 11 1967  02.0   13 6
0015 0050 0030 0055 0045 0060 0100 0061 0115 0062 0130 0059 0145 0063 0150 0073
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0200 0270 0215 0280 0230 0629 0245 0690 0300 0713 0315 0768 0330 0824 0345 0883
0400 0935 0415 1045 0430 1067 0445 1095 0500 1130 0515 1177 0530 1212 0545 1255
0600 1277 0615 1295 0630 1311 0645 1331 0700 1345 0715 1363 0730 1382 0745 1403
0800 1420 0815 1437 0830 1444 0845 1463 0900 1469 0915 1484 0930 1495 0945 1512
1000 1527 1015 1535 1030 1547 1045 1562 1100 1573 1115 1577 1130 1579 1140 1583
1156 1519 1203 1592 1215 1598 1230 1600 1245 1609 1300 1612 1315 1617 1330 1623
1345 1631 1400 1632 1415 1630 1430 1645 1445 1647 1500 1647 1515 1659 1530 1663
1545 1645 1600 1609 1613 1695 1630 1680 1642 1658 1648 1698 1700 1693 1706 1690
1712 1658 1718 1684 1730 1691 1745 1659 1800 1718 1815 1734 1830 1735 1845 1735
1900 1725 1915 1730 1930 1727 1945 1707 1955 1747 2015 1768 2030 1795 2040 1820
2046 1950 2100 1948 2115 1929 2130 1912 2145 1920 2200 1928 2215 1930 2230 1933
2245 1948 2300 1948 2315 1945 2330 1972 2345 1962 2400 1967
19 11 1967  02.0   11 6
0015 1966 0030 1978 0045 1977 0100 1978 0115 1979 0130 1993 0145 1985 0200 1989
0215 1997 0230 1997 0245 2000 0300 1998 0315 2002 0330 2000 0345 2005 0400 2003
0415 2013 0430 2016 0445 2023 0500 2030 0515 2035 0530 2041 0545 2044 0600 2047
0615 2050 0630 2053 0645 2067 0700 2069 0715 2080 0730 2077 0745 2083 0800 2087
0845 2107 0900 2117 0915 2120 0930 2123 0945 2128 1000 2134 1015 2140 1030 2142
1045 2143 1100 2143 1345 2148 1400 2152 1415 2153 1430 2157 1445 2161 1500 2164
1515 2170 1530 2177 1545 2178 1600 2179 1615 2183 1630 2189 1645 2190 1700 2195
1715 2197 1730 2198 1745 2199 1800 2200 1815 2202 1830 2203 1845 2195 1900 2207
1910 2204 1912 2190 1927 2220 1945 2218 2000 2222 2015 2255 2025 2201 2030 2225
2045 2226 2100 2228 2115 2232 2130 2234 2145 2233 2200 2225 2215 2237 2230 2229
2245 2242 2300 2245 2315 2247 2330 2250 2345 2253 2400 2257
20 11 1967  02.0   10 4
0015 2260 0030 2260 0045 2266 0100 2269 0115 2272 0130 2275 0145 2281 0200 2287
0215 2290 0230 2296 0245 2302 0300 2300 0315 2303 0330 2313 0345 2313 0400 2323
0415 2327 0430 2335 0445 2337 0500 2349 0515 2354 0530 2351 0545 2363 0600 2368
0615 2369 0630 2373 0645 2380 0700 2394 0715 2400 0730 2420 0745 2435 0800 2465
0806 2548 0815 2570 0830 2573 0845 2527 0900 2480 0915 2454 0930 2430 0945 2418
1000 2417 1015 2418 1030 2407 1045 2407 1100 2418 1115 2423 1130 2440 1147 2604
1200 2560 1203 2582 1215 2549 1230 2510 1245 2577 1300 2618 1315 2619 1325 2527
1900 2621 1917 2623 1930 2497 1945 2420 2000 2410 2015 2408 2030 2405 2045 2403
2100 2403 2115 2403 2130 2401 2145 2390 2200 2395 2215 2395 2230 2392 2300 2393
2315 2391 2330 2387 2345 2385 2400 2383
21 11 1967  02.0   11 7
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0215 2356 0230 2351 0245 2349 0300 2347 0315 2343 0330 2340 0345 2337 0400 2330
0415 2329 0430 2333 0445 2329 0500 2310 0515 2246 0530 2197 0545 2157 0600 2168
0615 2202 0630 2253 0645 2325 0700 2343 0715 2349 0730 2344 0745 2337 0800 2333
0830 2325 0845 2317 0900 2307 0915 2303 0930 2307 0945 2300 1000 2292 1015 2300
1030 2303 1045 2316 1100 2273 1112 2000 1129 1600 1136 1200 1156 0800 1208 0497
1223 0800 1236 1200 1250 1600 1303 2000 1315 2120 1330 2149 1345 2170 1400 2202
1415 2222 1430 2245 1445 2257 1500 2247 1515 2258 1530 2263 1536 2224 1545 2264
1600 2260 1615 2270 1630 2266 1645 2275 1700 2268 1715 2270 1730 2277 1745 2277
1800 2278 1815 2280 1830 2282 1845 2285 1900 2287 1915 2290 1930 2290 1945 2295
2000 2300 2015 2318 2030 2310 2100 2330 2130 2340 2200 2348 2400 2380
22 11 1967  02.0    8 6
0030 2387 0130 2390 0200 2386 0230 2390 0300 2390 0330 2409 0400 2418 0430 2435
0500 2445 0530 2455 0600 2470 0630 2475 0700 2485 0730 2495 0800 2492 0815 2496
0830 2500 0845 2497 0900 2497 0915 2500 0930 2505 0945 2508 1000 2515 1015 2519
1030 2519 1045 2523 1100 2527 1115 2530 1130 2530 1145 2537 1200 2535 1215 2540
1230 2550 1245 2547 1300 2554 1318 2559 1330 2552 1345 2560 1400 2575 1430 2590
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1445 2581 1500 2597 1515 2599 1530 2591 1545 2595 1945 2596 2000 2595 2015 2595
2030 2593 2045 2593 2115 2592 2130 2584 2145 2578 2200 2582 2215 2588 2230 2583
2245 2605 2300 2600 2315 2605 2330 2605 2345 2616 2400 2620
23 11 1967  02.0   11 4
0015 2621 0030 2623 0045 2620 0100 2620 0115 2622 0130 2622 0145 2625 0200 2628
0215 2624 0230 2622 0245 2622 0300 2625 0315 2623 0330 2620 0345 2617 0400 2616
0415 2610 0430 2610 0445 2608 0500 2612 0515 2617 0530 2612 0600 2622 0630 2634
0700 2634 0730 2636 0800 2617 0815 2607 0830 2597 0845 2597 0900 2595 0915 2605
0930 2610 0945 2607 1000 2593 1015 2589 1030 2597 1045 2600 1100 2602 1115 2604
1130 2605 1200 2607 1215 2607 1230 2615 1245 2608 1300 2608 1315 2587 1330 2585
1345 2583 1400 2587 1415 2587 1430 2588 1445 2583 1500 2577 1515 2573 1530 2562
1545 2570 1600 2580 1615 2585 1630 2593 1645 2585 1700 2580 1715 2589 1730 2611
1800 2608 1830 2632 1845 2650 1900 2655 1930 2660 2000 2705 2030 2660 2100 1985
2116 2400 2130 2632 2145 2680 2200 2748 2215 2700 2230 2688 2245 2640 2300 2622
2308 2540 2325 2708 2345 2702 2400 2717
24 11 1967  02.0   11 2   20
0015 2679 0030 2678 0100 2678 0115 2703 0130 2708 0200 2740 0215 2747 0230 2760
0245 2770 0300 2772 0315 2771 0330 2770 0345 2767 0400 2765 0415 2763 0430 2761
0445 2763 0500 2758 0515 2758 0530 2772 0545 2772 0600 2757 0615 2754 0630 2753
0645 2753 0700 2753 0715 2753 0730 2749 0745 2747 0800 2745 0815 2741 0830 2723
0845 2708 0900 2707 0915 2719 0930 2717 0945 2716 1000 2715 1015 2705 1030 2649
1045 2615 1415 2657 1430 2718 1445 2722 1500 2710 1515 2716 1530 2718 1545 2719
1600 2582 1616 2656 1626 2676 1642 2653 1700 2708 1715 2750 1730 2778 1745 2784
1800 2784 1815 2780 1830 2780 1845 2771 1900 2763 1915 2760 1930 2758 1945 2752
2000 2746 2015 2740 2030 2742 2045 2743 2100 2742 2115 2738 2130 2737 2145 2735
2200 2735 2215 2733 2230 2732 2245 2730 2300 2726 2315 2724 2330 2727 2345 2716
2355 2698 2400 2706
25 11 1967  02.0   13 4
0015 2736 0030 2749 0045 2750 0100 2766 0115 2770 0130 2754 0145 2729 0200 2730
0215 2732 0230 2735 0245 2734 0300 2735 0315 2735 0330 2728 0345 2719 0350 2678
0400 2683 0415 2737 0430 2781 0445 2773 0500 2771 0512 2693 0528 2695 0535 2740
0545 2712 0600 2667 0615 2662 0630 2643 0645 2652 0700 2663 0715 2668 0730 2669
0745 2668 0800 2667 0815 2667 0830 2667 0845 2670 0900 2673 0915 2677 0930 2680
0945 2681 1000 2683 1015 2687 1030 2687 1045 2685 1100 2686 1115 2686 1130 2686
1145 2687 1200 2687 1215 2687 1230 2688 1245 2690 1300 2690 1315 2690 1330 2692
1345 2690 1400 2657 1416 2455 1425 2550 1430 2517 1443 2572 1453 2659 1500 2665
1515 2704 1530 2698 1545 2674 1600 2669 1615 2661 1630 2645 1645 2646 1700 2680
1715 2673 1730 2643 1745 2601 1800 2575 1815 2570 1830 2570 1845 2575 1900 2593
1915 2608 1930 2617 1945 2623 2000 2625 2015 2622 2030 2618 2045 2613 2100 2613
2115 2615 2130 2618 2145 2607 2200 2590 2215 2590 2230 2597 2245 2616 2300 2620
2315 2627 2330 2629 2345 2640 2400 2631
26 11 1967  02.0   11 6
0015 2630 0030 2632 0045 2625 0100 2613 0115 2610 0130 2599 0145 2598 0200 2593
0215 2589 0230 2598 0235 2608 0245 2585 0300 2563 0315 2537 0330 2539 0345 2544
0400 2541 0415 2536 0430 2537 0445 2536 0500 2539 0515 2520 0530 2523 0545 2526
0600 2525 0615 2522 0630 2560 0637 2575 0654 2509 0700 2508 0715 2510 0730 2510
0745 2509 0800 2504 0815 2505 0830 2505 0845 2503 0900 2500 0915 2498 0930 2494
0945 2490 1000 2485 1015 2465 1026 2400 1050 2055 1110 2400 1126 2483 1145 2490
1200 2482 1215 2487 1230 2477 1245 2471 1300 2466 1315 2463 1330 2457 1345 2455
1400 2448 1415 2447 1430 2442 1445 2440 1800 2435 1815 2433 1830 2425 1845 2417
1900 2417 1915 2415 1930 2186 1945 2405 2000 2397 2015 2392 2030 2381 2045 2386
2100 2384 2115 2379 2130 2365 2145 2350 2200 2333 2206 2320 2216 2277 2230 2298
2245 2299 2300 2297 2315 2293 2330 2290 2345 2284 2400 2280
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27 11 1967  02.0   13 2
0015 2278 0030 2272 0045 2267 0100 2263 0115 2256 0130 2249 0145 2241 0200 2233
0215 2235 0230 2235 0245 2226 0300 2232 0315 2237 0330 2237 0345 2237 0400 2238
0415 2240 0430 2240 0445 2240 0500 2238 0515 2240 0530 2241 0545 2240 0600 2237
0615 2232 0630 2232 0645 2229 0700 2225 0715 2223 0730 2218 0745 2215 0800 2212
0815 2209 0830 2205 0845 2203 0900 2205 0915 2207 0930 2207 0945 2207 1000 2205
1005 2197 1030 2201 1045 2208 1100 2216 1115 2219 1130 2228 1145 2231 1200 2233
1215 2237 1230 2237 1245 2238 1300 2239 1315 2240 1330 2238 1345 2240 1400 2242
1415 2243 1430 2244 1445 2245 1500 2245 1515 2243 1530 2244 1545 2248 1600 2253
1615 2264 1630 2277 1645 2281 1700 2283 1715 2284 1730 2283 1745 2289 1800 2289
1815 2290 1820 2314 1830 2315 1845 2292 1900 2286 1915 2286 1930 2288 1945 2290
2000 2292 2015 2291 2030 2277 2036 2325 2045 2328 2100 2330 2115 2328 2130 2327
2145 2326 2200 2326 2215 2327 2230 2331 2245 2333 2300 2352 2315 2337 2330 2339
2345 2340 2400 2337
28 11 1967  02.0   11 5   19
0013 2340 0017 2304 0026 2338 0032 2280 0037 2354 0100 2353 0115 2355 0130 2358
0145 2361 0200 2366 0215 2369 0225 2365 0231 2347 0245 2370 0300 2390 0315 2396
0330 2398 0345 2400 0400 2404 0415 2404 0430 2405 0445 2405 0500 2404 0515 2405
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1345 2416 1400 2416 1415 2416 1430 2415 1445 2415 1500 2415 1515 2413 1530 2413
1545 2412 1600 2413 1615 2412 1630 2413 1645 2413 1700 2413 1715 2411 1730 2411
1745 2411 1800 2410 1815 2412 1830 2412 1836 2410 1842 2322 1845 2410 1853 2302
1905 2243 1917 2400 1930 2412 1945 2413 2000 2413 2015 2411 2030 2410 2045 2410
2100 2411 2115 2411 2130 2410 2145 2410 2200 2410 2215 2409 2230 2408 2245 2410
2300 2410 2315 2410 2330 2409 2345 2410 2400 2410
28 11 1967  03.0    1 4
2315 2408 2330 2408 2345 2408 2400 2408
29 11 1967  03.0   12 3
0015 2407 0030 2407 0045 2409 0100 2408 0115 2407 0130 2406 0145 2407 0200 2407
0215 2406 0230 2406 0245 2405 0300 2403 0315 2403 0330 2403 0335 2400 0355 2182
0412 2400 0425 2400 0432 2325 0445 2382 0500 2402 0515 2402 0530 2405 0545 2403
0600 2403 0615 2397 0630 2393 0645 2390 0700 2387 0708 2340 0713 2367 0730 2359
0745 2347 0800 2334 0810 2110 0821 1992 0844 2236 0900 2125 0915 1987 1230 2255
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1417 2370 1430 2370 1445 2344 1500 2338 1515 2363 1530 2368 1545 2369 1600 2365
1615 2300 1618 2185 1643 2000 1648 1600 1656 1200 1703 0912 1715 0815 1726 0860
1736 1200 1755 1600 1800 2000 1815 2145 1830 2232 1845 2269 1900 2299 1915 2321
1930 2324 1945 2347 2000 2351 2015 2358 2030 2361 2045 2362 2100 2362 2115 2363
2130 2363 2145 2362 2200 2362 2215 2362 2230 2362 2245 2362 2300 2363 2315 2360
2330 2360 2345 2360 2400 2360
30 11 1967  03.0   11 3
0015 2358 0030 2358 0045 2358 0100 2357 0115 2356 0130 2355 0145 2352 0200 2352
0215 2352 0230 2351 0245 2349 0300 2348 0315 2347 0330 2345 0345 2344 0400 2344
0415 2341 0430 2340 0445 2340 0500 2340 0515 2339 0530 2338 0545 2338 0600 2336
0613 2337 0630 2336 0645 2336 0700 2334 0715 2333 0730 2332 0745 2333 0800 2330
0815 2330 0830 2329 0845 2327 0900 2327 0915 2325 0930 2325 0945 2324 1000 2324
1015 2323 1030 2322 1045 2321 1100 2320 1115 2320 1130 2311 1145 2307 1200 2303
1215 2299 1230 2291 1245 2289 1300 2285 1315 2282 1330 2280 1345 2279 1400 2277
1415 2275 1430 2271 1445 2269 1500 2267 1830 2260 1845 2257 1900 2256 1915 2253
1930 2250 1945 2248 2000 2245 2015 2243 2030 2241 2045 2240 2100 2240 2115 2238
2130 2238 2145 2237 2200 2237 2215 2234 2230 2233 2245 2231 2300 2238 2315 2224
2330 2223 2345 2220 2400 2215
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01 12 1967  03.0   11 3
0015 2215 0030 2216 0045 2210 0100 2208 0115 2193 0130 2187 0145 2179 0200 2166
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0815 1925 0830 1923 0845 1928 0900 1925 0915 1924 0930 1920 0945 1912 1000 1905
1015 1895 1030 1890 1045 1888 1100 1885 1115 1879 1130 1860 1145 1840 1200 1825
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1815 1533 1830 1534 1845 1487 1900 1397 1912 1253 1917 1259 1930 1219 1944 1235
1953 1305 2000 1259 2018 1200 2030 1175 2045 1152 2100 1128 2115 1105 2130 1080
2145 1061 2200 1041 2215 1018 2230 0991 2245 0967 2254 0960 2300 1029 2315 1018
2330 0998 2345 0977 2400 0970
02 12 1967  03.0   14 5
0015 0953 0030 0900 0042 0845 0044 0939 0053 0863 0100 0874 0113 0890 0118 0953
0130 0958 0145 0929 0200 0938 0215 0918 0230 0875 0236 0830 0245 0812 0300 0797
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0447 0521 0500 0516 0515 0485 0530 0449 0545 0413 0600 0398 0615 0390 0630 0387
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0830 0415 0845 0391 0900 0358 0915 0292 0930 0267 0945 0266 1000 0247 1015 0232
1030 0231 1045 0238 1100 0204 1115 0183 1130 0177 1145 0150 1200 0132 1214 0137
1220 0185 1222 0188 1235 0247 1250 0066 1300 0070 1315 0070 1330 0063 1345 0060
1400 0060 1415 0058 1430 0058 1445 0052 1500 0052 1515 0052 1530 0050 1545 0055
1600 0060 1615 0049 1630 0051 1645 0048 1700 0048 1715 0048 1730 0048 1745 0051
1800 0051 1815 0054 1830 0058 1845 0059 1900 0067 1912 0069 1913 0079 1930 0103
1945 0111 2000 0110 2001 0138 2015 0140 2030 0150 2045 0185 2100 0227 2115 0300
2124 0400 2152 0800 2200 0900 2203 0908 2212 1053 2225 1035 2235 1073 2250 1130
2300 1200 2315 1247 2330 1287 2345 1390 2400 1423
03 12 1967  03.0   10 1
0015 1495 0030 1525 0045 1593 0049 1602 0100 1592 0115 1600 0130 1623 0200 1700
0230 1746 0300 1728 0330 1770 0400 1828 0430 1887 0500 1917 0530 1971 0600 2013
0630 2042 0700 2087 0715 2092 0730 2100 0745 2108 0800 2111 0815 2153 0830 2178
0845 2205 0900 2206 0915 2205 0930 2226 0945 2245 1000 2264 1015 2270 1030 2277
1045 2284 1100 2292 1115 2295 1130 2298 1145 2305 1200 2315 1215 2317 1230 2323
1245 2327 1300 2350 1315 2330 1330 2334 1345 2338 1400 2339 1415 2343 1430 2350
1445 2355 1500 2359 1515 2353 1530 2360 1545 2373 1600 2378 1930 2383 1945 2380
2000 2386 2015 2386 2030 2390 2045 2394 2100 2400 2115 2403 2130 2405 2145 2412
2200 2418 2215 2420 2230 2445 2245 2430 2300 2436 2315 2435 2330 2430 2345 2429
2400 2430
04 12 1967  03.0   12 7
0015 2425 0022 2427 0100 2425 0130 2390 0144 2375 0152 2308 0208 2122 0215 2133
0230 2116 0245 2054 0300 1979 0316 1850 0331 1787 0345 1757 0400 1687 0415 1605
0430 1533 0445 1465 0500 1394 0515 1307 0530 1265 0545 1224 0600 1157 0615 1068
0630 0970 0645 0840 0700 0756 0715 0701 0730 0671 0745 0632 0800 0585 0815 0539
0830 0487 0845 0463 0900 0430 0915 0388 0930 0359 0945 0329 1000 0299 1015 0283
1030 0269 1045 0254 1100 0241 1115 0228 1130 0218 1145 0207 1200 0197 1215 0179
1230 0163 1245 0151 1300 0143 1315 0139 1330 0135 1345 0131 1400 0126 1415 0118
1430 0112 1445 0104 1500 0102 1515 0113 1530 0120 1545 0128 1600 0139 1615 0151
1630 0165 1645 0181 1700 0213 1715 0253 1730 0300 1745 0356 1800 0405 1815 0455
1830 0490 1845 0525 1900 0554 1915 0580 1930 0603 1945 0620 2000 0633 2015 0642
2030 0646 2045 0651 2100 0654 2115 0658 2130 0660 2145 0663 2200 0665 2215 0667
2230 0670 2245 0678 2300 0692 2315 0713 2330 0738 2345 0777 2400 0892
05 12 1967  03.0   13 2   19
0015 0864 0030 0927 0045 0987 0100 1051 0115 1120 0127 1200 0136 1480 0139 1410
```

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0152 1600 0208 2000 0230 2455 0245 2476 0300 2471 0315 2460 0330 2450 0345 2441
0400 2441 0415 2440 0430 2439 0445 2438 0500 2437 0515 2436 0530 2437 0545 2439
0600 2442 0615 2443 0630 2447 0645 2450 0700 2450 0715 2449 0730 2452 0745 2455
0800 2455 0815 2454 0830 2454 0845 2453 0900 2455 0915 2455 0930 2457 0945 2457
1000 2460 1015 2462 1030 2466 1045 2474 1100 2477 1115 2485 1130 2493 1145 2501
1200 2507 1215 2509 1230 2510 1245 2512 1300 2537 1315 2536 1330 2547 1345 2553
1400 2564 1415 2573 1430 2577 1445 2581 1500 2597 1515 2600 1530 2580 1545 2560
1555 2565 1600 2591 1615 2582 1630 2575 1645 2574 1700 2569 1715 2570 1730 2570
1745 2570 1800 2570 1815 2567 1830 2563 1845 2560 1900 2557 1915 2553 1930 2548
1945 2544 2000 2541 2015 2538 2030 2547 2045 2532 2100 2528 2115 2525 2130 2523
2145 2519 2200 2518 2215 2515 2230 2513 2245 2511 2300 2509 2315 2503 2330 2500
2345 2497 2400 2495
05 12 1967  04.0    1 4
2315 2494 2330 2494 2345 2489 2400 2484
06 12 1967  04.0   11 6   19
0015 2480 0030 2477 0045 2473 0100 2467 0115 2463 0130 2464 0145 2446 0200 2443
0215 2440 0230 2433 0245 2433 0300 2428 0315 2430 0330 2423 0345 2421 0400 2417
0415 2411 0430 2407 0445 2405 0500 2393 0515 2393 0530 2389 0545 2395 0600 2385
0615 2385 0630 2380 0645 2369 0700 2367 0715 2369 0730 2360 0745 2360 0800 2354
0815 2348 0830 2352 0845 2352 0900 2354 0915 2354 0930 2355 0945 2355 1000 2355
1015 2355 1030 2356 1045 2357 1100 2357 1115 2358 1130 2360 1145 2365 1200 2367
1215 2372 1230 2377 1240 2380 1300 2381 1315 2384 1330 2384 1345 2384 1400 2384
1415 2384 1430 2375 1440 2235 1722 2220 1750 1944 1800 1890 1815 1846 1830 1828
1845 1690 1900 1595 1913 1545 1924 1650 1937 1465 1950 1524 2000 1440 2010 1480
2020 1388 2030 1415 2045 1340 2100 1295 2115 1250 2130 1181 2145 1160 2200 1148
2210 1255 2221 1055 2245 1130 2300 1118 2320 0990 2340 1008
07 12 1967  04.0   10 8   11
0000 0986 0015 0968 0030 0960 0045 0869 0100 0830 0115 0880 0130 0870 0145 0914
0200 0937 0215 0954 0230 0954 0245 0986 0300 1015 0315 1000 0330 0900 0345 0800
0400 0750 0415 0772 0425 0770 0443 0985 0500 0961 0515 0910 0530 0810 0545 0600
0600 0340 0615 0120 0630 0060 0645 0120 0700 0125 0715 0116 0730 0116 0745 0034
0800 0028 1200 0153 1215 0159 1230 0164 1245 0165 1300 0158 1400 0296 1415 0335
1427 0467 1450 0710 1500 0627 1515 0697 1530 0790 1545 0844 1600 0865 1615 0883
1632 0829 1645 0940 1701 1200 1722 1600 1735 1717 1800 1500 1812 1600 1833 2000
1848 2185 1900 2132 1915 2109 1936 1935 1947 1990 2000 1970 2010 1980 2022 2081
2043 1883 2052 1913 2101 1797 2115 1763 2130 1730 2147 1635 2200 1596 2204 1566
2230 1745 2246 1834 2258 1955 2303 2000 2330 2140 2343 2253 2351 2200 2400 2197
08 12 1967  04.0   10 7   12
0015 2051 0031 2290 0045 2290 0058 2188 0120 2000 0136 1940 0142 2000 0147 2160
0200 2000 0215 2066 0230 2147 0245 2278 0255 2333 0315 2198 0330 2138 0347 2050
0350 2161 0400 2180 0415 2220 0430 2305 0443 2400 0500 2630 0513 2710 0530 2603
0544 2710 0600 2711 0607 2662 0617 2715 0630 2702 0645 2662 0700 2694 0715 2762
0730 2790 0745 2808 0800 2790 0815 2818 0830 2788 0845 2800 0900 2858 0915 2866
0922 2845 0930 2895 1000 2960 1530 2906 1600 2800 1630 2723 1645 2707 1700 2710
1715 2758 1732 2720 1744 2777 1800 2756 1815 2762 1829 2738 1845 2758 1900 2778
1914 2737 1928 2756 1937 2703 1950 2653 2000 2658 2010 2691 2020 2590 2029 2589
2045 2556 2100 2546 2112 2617 2131 2523 2145 2574 2200 2630 2213 2762 2222 2608
2237 2680 2249 2613 2300 2628 2310 2590 2328 2708 2339 2565 2355 2620
09 12 1967  04.0   15 5
0006 2634 0016 2560 0026 2667 0030 2635 0036 2715 0052 2538 0100 2495 0112 2579
0118 2502 0130 2533 0145 2540 0152 2520 0200 2597 0213 2580 0220 2504 0226 2498
0232 2522 0241 2509 0255 2680 0300 2630 0303 2605 0315 2630 0325 2600 0340 2608
0355 2546 0401 2690 0419 2458 0435 2549 0444 2522 0500 2553 0512 2530 0518 2567
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0535 2495 0545 2503 0553 2465 0600 2475 0609 2460 0620 2448 0630 2455 0645 2457
0700 2446 0715 2475 0729 2526 0741 2400 0800 2145 0809 2170 0814 2235 0820 2197
0829 2197 0835 2230 0846 2166 0900 2236 0915 2212 0930 2209 0945 2210 1000 2209
1015 2162 1033 2015 1040 2055 1049 2000 1100 1810 1114 1600 1130 1476 1156 2000
1215 2250 1230 2482 1243 2348 1300 2178 1330 2544 1345 2622 1400 2674 1415 2718
1430 2741 1445 2783 1500 2410 1501 2400 1516 2048 1528 2000 1537 1600 1548 1200
1558 0925 1609 0858 1623 1200 1633 1600 1642 2000 1650 2400 1652 2473 1700 2380
1707 2187 1715 2263 1721 2188 1737 2000 1756 1600 1802 1012 1813 1200 1829 1600
1848 2000 1908 2400 1931 2800 1934 2808 1945 2750 1952 2800 2000 2930 2013 3200
2030 3232 2047 3230 2100 3165 2115 3176 2130 3185 2150 2970 2202 2800 2224 2400
2300 2046 2313 1667 2336 2000 2345 2056 2400 2178
10 12 1967  04.0     9 4
0016 2400 0047 2743 0100 2718 0108 2800 0131 3200 0156 3240 0200 3238 0230 3060
0245 2993 0300 3160 0315 3270 0330 3250 0345 3308 0400 3350 0406 3365 0420 3241
0430 3266 0445 3255 0500 3400 0520 3600 0526 3755 0545 3890 0600 3957 0615 3963
0630 3973 1330 3945 1400 4140 1415 4210 1430 4172 1445 4138 1500 4143 1515 4105
1525 4067 1545 4080 1554 4116 1615 3740 1625 3700 1635 4100 1645 4130 1700 4130
1715 4125 1725 4000 1745 3800 1800 3737 1815 3720 1830 3550 1900 3300 1913 3138
1925 3200 1930 3283 1948 3115 2000 3181 2014 3050 2030 3042 2045 3020 2100 2985
2122 2807 2137 2970 2147 2907 2200 2948 2213 2877 2230 2937 2245 2929 2300 2883
2315 2898 2330 2800 2341 2893 2356 2790
11 12 1967  04.0    13 2
0002 2875 0021 2750 0030 2893 0045 2883 0100 2865 0115 2870 0130 2800 0138 2660
0150 2868 0200 2860 0215 2884 0219 2777 0230 2893 0245 2853 0300 2875 0315 2880
0328 2702 0345 2848 0400 2750 0410 2775 0415 2815 0430 2800 0435 2825 0440 2815
0445 2830 0450 2810 0455 2805 0500 2800 0515 2782 0530 2770 0545 2784 0600 2765
0615 2758 0630 2760 0645 2772 0700 2757 0715 2733 0728 2760 0733 2697 0745 2720
0800 2747 0815 2731 0830 2755 0845 2754 0900 2736 0915 2727 0930 2739 0945 2741
1000 2773 1016 2747 1020 2778 1024 2744 1040 2800 1049 2784 1100 2805 1115 2820
1126 2803 1145 2832 1200 2850 1210 2847 1215 2867 1220 2846 1230 2870 1245 2882
1300 2885 1315 2889 1330 2908 1345 2909 1400 2909 1415 2909 1430 2910 1445 2910
1500 2910 1515 2910 1530 2910 1545 2910 1600 2910 1615 2910 1630 2910 1645 2910
1700 2910 1715 2911 1730 2911 1745 2911 1800 2911 1815 2912 1830 2912 1845 2911
1900 2911 2200 2911 2215 2911 2230 2911 2245 2910 2300 2910 2315 2910 2330 2910
2345 2911 2400 2910
12 12 1967  04.0    11 4    14
0015 2911 0030 2911 0045 2910 0100 2910 0115 2910 0130 2910 0145 2910 0200 2910
0215 2910 0230 2910 0245 2910 0300 2910 0315 2910 0330 2910 0345 2910 0400 2910
0415 2910 0430 2910 0445 2910 0500 2908 0515 2907 0530 2907 0545 2906 0600 2906
0615 2904 0630 2902 0645 2901 0700 2900 0715 2899 0730 2898 0745 2897 0800 2898
0815 2898 0830 2900 0845 2901 0900 2903 0915 2904 0930 2905 0945 2902 1000 2909
1015 2910 1030 2911 1045 2912 1100 2913 1115 2915 1130 2915 1145 2915 1200 2914
1215 2915 1230 2915 1245 2915 1300 2915 1315 2915 1330 2915 1345 2915 1400 2915
1415 2915 1430 2915 1445 2915 1500 2915 1815 2916 1830 2915 1845 2915 1900 2915
1915 2915 1930 2915 1945 2915 2000 2914 2015 2914 2030 2914 2045 2914 2100 2914
2115 2914 2130 2916 2145 2916 2200 2916 2215 2916 2230 2915 2245 2915 2300 2913
2315 2913 2330 2913 2345 2913 2400 2912
12 12 1967  05.0     1 4
2315 2911 2330 2910 2345 2909 2400 2909
13 12 1967  05.0     8 2
0015 2909 0030 2908 0045 2908 0100 2907 0115 2900 0130 2896 0145 2895 0200 2894
0215 2890 0230 2878 0245 2873 0300 2871 0315 2862 0330 2858 0345 2855 0400 2847
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0415 2847 0430 2848 0445 2842 0500 2830 0515 2831 0530 2835 0545 2835 0600 2837
0800 2855 1300 2823 1615 2822 1630 2822 1645 2821 1700 2823 1715 2817 1730 2813
1745 2811 1800 2808 1815 2794 1830 2763 1845 2742 1900 2700 1915 2664 1930 2640
1945 2610 2000 2592 2015 2569 2030 2549 2045 2530 2100 2509 2115 2497 2130 2482
2145 2473 2200 2457 2215 2440 2230 2427 2245 2430 2300 2418 2315 2409 2330 2418
2345 2422 2400 2405
14 12 1967  05.0     9 7
0015 2413 0030 2404 0039 2397 0100 2430 0115 2442 0130 2463 0145 2465 0200 2486
0215 2498 0230 2493 0245 2510 0300 2525 0315 2532 0330 2530 0345 2532 0400 2539
0415 2541 0430 2534 0445 2540 0500 2536 0515 2544 0530 2553 0545 2553 0600 2551
0615 2549 0630 2537 0637 2525 0645 2513 0652 2494 0700 2475 0707 2462 0715 2450
0730 1500 0745 1000 0750 0600 0755 0483 0800 0365 0815 0900 0825 1100 0830 1000
0910 1050 0930 1310 0945 1810 1000 2100 1020 2320 1030 2310 1045 2000 1100 1780
1110 1570 1130 1180 1140 1104 1150 1170 1158 0948 1212 1290 1216 1180 1225 1280
1233 1165 1245 1520 1248 1220 1300 1375 1313 1600 1333 0980 1348 0878 1400 0800
1420 0360 1430 0440 1440 0350 1450 0485 1500 0505 1515 0532 1530 0540
14 12 1967  05.0    26 2    14
1544 0318 1545 0308 1548 0300 1549 0296 1550 0308 1553 0294 1554 0294 1555 0350
1557 0367 1558 0402 1600 0386 1601 0394 1604 0325 1605 0340 1606 0330 1607 0338
1609 0326 1610 0361 1612 0371 1613 0366 1615 0384 1616 0380 1618 0374 1620 0374
1621 0388 1622 0319 1623 0329 1625 0356 1627 0332 1630 0322 1633 0321 1636 0319
1637 0317 1639 0317 1642 0316 1645 0312 1648 0310 1650 0308 1651 0310 1652 0307
1653 0309 1654 0306 1655 0309 1657 0302 1700 0300 1702 0297 1703 0298 1706 0302
1709 0306 1710 0307 1711 0307 1712 0305 1714 0408 1716 0400 1717 0360 1718 0331
1721 0315 1724 0308 1727 0306 1730 0306 1731 0306 1733 0311 1735 0315 1736 0310
1739 0306 1742 0302 1744 0370 1745 0295 1746 0341 1747 0341 1748 0324 1751 0308
1754 0316 1755 0320 1757 0338 1758 0328 1800 0318 1803 0316 1804 0317 1805 0308
1806 0309 1808 0305 1809 0309 1811 0318 1812 0310 1815 0319 1817 0323 1818 0321
1819 0328 1820 0321 1821 0335 1822 0331 1823 0328 1824 0319 1826 0321 1827 0337
1828 0317 1830 0308 1833 0300 1834 0312 1835 0294 1836 0288 1838 0340 1839 0332
1840 0295 1842 0287 1843 0288 1845 0280 1848 0272 1849 0268 1851 0312 1852 0313
1854 0280 1857 0261 1900 0253 1903 0243 1906 0237 1909 0230 1912 0224 1915 0221
1918 0217 1921 0212 1924 0208 1927 0206 1930 0203 1933 0200 1936 0198 1939 0195
1942 0192 1943 0192 1945 0189 1948 0187 1951 0185 1954 0181 1957 0178 2000 0176
2003 0172 2006 0168 2009 0165 2012 0161 2015 0156 2018 0151 2021 0149 2024 0145
2027 0143 2030 0142 2031 0140 2033 0138 2039 0128 2042 0122 2045 0112 2046 0109
2048 0073 2049 0026 2050 0029 2052 0020 2054 0018 2055 0016 2100 0014 2103 0013
2106 0014 2109 0014 2112 0015 2121 0017 2122 0017 2124 0019 2125 0025 2127 0050
2130 0123 2133 0146 2136 0152 2139 0158 2142 0163 2145 0168 2148 0172 2151 0176
2154 0180 2157 0183 2200 0186 2205 0192 2210 0202 2215 0214 2220 0226 2225 0238
2230 0248 2235 0258 2240 0270 2245 0280 2250 0288 2255 0298 2300 0307 2305 0313
2310 0323 2315 0331 2320 0340 2325 0350 2330 0358 2335 0367 2340 0377 2345 0389
2349 0400 2355 0406
15 12 1967  05.0     2 8    17
0000 0407 0005 0405 0010 0394 0015 0383 0020 0377 0025 0372 0030 0368 0035 0362
0100 0345 0130 0200 0200 0170 0220 0140 0230 0130 0300 0140 0330 0140 0400 0130
```

Input data must be followed by a blank card.

17	11	1967	2.	1	4	19	0	1
17	11	1967	2.	7	3	19	1	2
18	11	1967	2.	13	6	19	8	3
19	11	1967	2.	11	6	19	21	4
20	11	1967	2.	10	4	19	32	5
21	11	1967	2.	11	7	19	42	6
22	11	1967	2.	8	6	19	53	7
23	11	1967	2.	11	4	19	61	8
24	11	1967	2.	11	2	20	72	9
25	11	1967	2.	13	4	20	83	10
26	11	1967	2.	11	6	20	96	11
27	11	1967	2.	13	2	20	107	12
28	11	1967	2.	11	5	19	120	13
28	11	1967	3.	1	4	19	131	14
29	11	1967	3.	12	3	19	132	15
30	11	1967	3.	11	3	19	144	16
1	12	1967	3.	11	3	19	155	17
2	12	1967	3.	14	5	19	166	18
3	12	1967	3.	10	1	19	180	19
4	12	1967	3.	12	7	19	190	20
5	12	1967	3.	13	2	19	202	21
5	12	1967	4.	1	4	19	215	22
6	12	1967	4.	11	6	19	216	23
7	12	1967	4.	10	8	11	227	24
8	12	1967	4.	10	7	12	237	25
9	12	1967	4.	15	5	12	247	26
10	12	1967	4.	9	4	12	262	27
11	12	1967	4.	13	2	12	271	28
12	12	1967	4.	11	4	14	284	29
12	12	1967	5.	1	4	14	295	30
13	12	1967	5.	8	2	14	296	31
14	12	1967	5.	9	7	14	304	32
14	12	1967	5.	26	2	14	313	33
15	12	1967	5.	2	8	17	339	34
0	0	0	0.	0	0	17	341	35

OUTPUT

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*ONE WORD INTEGERS
*ARITHMETICTRACE
*TRANSFERTRACE
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
C NATS2
C PROGRAM NATS2 TO PROJECT TOPO STARTING FROM TOPO STORED ON DISK.
C FOR SSPR,SSPU,SSPL NONZERO RESPECTIVELY, THE PROJECTED OUTPUT IS
C PRINTED, PUNCHED OR PLOTTED.
C ANGLE IS ANGLE WHICH POSITIVE DIRECTION OF PROJECTED PROFILE MAKES
C WITH NORTH TAKEN CLOCKWISE FROM NORTH (0 TO 360)
C XMIN IS STARTING DISTANCE IN MILES OF ORIGINAL NAVIGATION AT WHICH
C PROJECTION STARTS.
C XMAX IS FINAL DISTANCE AT WHICH PROJECTION STOPS
C VLAT AND VLON ARE LAT AND LONG OF ORIGIN OF PROJECTED PROFILE
C IS2=0 IF AVERAGE SHIP COURSE MAKES ACUTE ANGLE WITH PROJECTED
C DIRECTION OTHERWISE IT IS =1
C XKM,ZINCH,XSCAL,ZSCAL,FAC ARE ONLY READ IF SSPL IS NONZERO
C PRINTED AND PUNCHED OUTPUT CONSIST OF PROJECTED DISTANCE IN KM
C AND DEPTH IN UNCORRECTED FATHOMS(OR CORRECTED METERS)
C THE ORIGIN OF THE PLOT IS MOVED FROM THE PEN POSITION BY ZINCH INCHES
C TOWARDS THE POSITIVE Y DIRECTION AND XKM KMS(SCALED TO INCHES) IN THE
C POSITIVE X DIRECTION.
C XSCAL AND ZSCAL GIVE X AND Y SCALES (KMS PER INCH, FATHOMS OR METERS
C PER INCH).
C Y SCALE IS FURTHER REDUCED BY THE FACTOR FAC.
C IF FAC = 0, PROGRAM SETS = 1.
C PROGRAM SETS ZSCAL=-ZSCAL TO PLOT DEPTHS IN NEGATIVE SENSE.
C IS3=0 FOR FATHOMS, NONZERO FOR METERS.
C PRINTED AND PUNCHED ANSWERS AT FORMAT(1H 6(F7.1,I6))
C IF NO. OF OUTPUT POINTS IS EVEN MULTIPLE OF SIX LAST PRINTED LINE OR
C PUNCHED CARD IS REPEATED.
C USE PROGRAM PTROJ TO PLOT PUNCHED OUTPUT OF NATS2 IF SEPARATE PLOTTING
C IS DESIRED. PTROJ IS NOT GIVEN AS A PART OF THIS SYSTEM.
C CONSIDERING THE ORIGIN TO BE AT XKM AND ZINCH,
C TICK MARKS EXTEND 3 INCHES BELOW ORIGIN TO 5 INCHES ABOVE ORIGIN AND
C TO 0.1 INCHES IN THE + X DIRECTION
C PROGRAM WILL START FROM DAY NUMBER KS+1
C NEW DATA CAN BE LOADED IF SAME LEG
C AFTER PLOT PEN GOES TO XNEXT INCHES BEYOND PLOT ORIGIN (NOT PEN
C ORIGIN)
C HOWEVER IF XNEXT=0, PROGRAM AUTOMATICALLY SETS IT=-XKM/SCALX SO THAT
C PEN RETURNS TO PEN ORIGIN
C PROGRAM DOES NOT EXIT BUT GOES BACK TO START TO LOAD NEW DATA.
```

```
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 4 (32000,3,U,INXT)
      DEFINE FILE 12(500,11,U,INXT)
      DEFINE FILE 13(2500,16,U,INXT)
      DEFINE FILE 14(3536,1,U,INXT)
      DIMENSION AM(12),AY(11),THR(9),TMIN(9),G(9) ,V(68),KV(68),JG(9),
     1JTIM(9)
      COMMON AM,AY
  293 CALL AMAY
      KS=0
      NMZPR=0
      IND1=0
      KB=1
    8 READ(8,702)ANGLE,XMIN,XMAX,VLAT,VLON,IS2,IS3,SSPR,SSPU,SSPL,KS
      IF(SSPL)200,20,200
  200 READ(8,703)XKM,ZINCH,XSCAL,ZSCAL,FAC,XNEXT
      ZSCAL=-ZSCAL
      CALL SCALF(1.0, 1.0,0.0,0.0)
   20 READ(3'1)DISA ,I,DMAX,CRUIS,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
      XXE=0.
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      DEN=(PLAT2-PLAT1)/DELT
      DEM=DELCN(PLNG2-PLNG1)/DELT
      EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
      FOT=1000.*EOT
      GO TO (402,2221),KB
  402 KS=KS+1
      READ(12'KS)JDAY,MON,JYR,TZ,LB,LC,NMZ,KT
      IF(JDAY)6,6,4021
 4021 IF(NMZ-NMZPR)601,602,601
  601 DO 603 NQQ=1,68
       KNQQ=(NMZ-1)*68+NQQ
       READ(14'KNQQ)KV(NQQ)
  603 V(NQQ)=KV(NQQ)
       NMZPR=NMZ
  602 CONTINUE
      KB=2
   85 L=0
```

```
      AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
  221 KT=KT+1
       READ(13'KT)(JTIM(I),JG(I), I=1,8)
      DO 2399 I=1,8
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      G(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
      J=0
      L=L+1
      IF(L-LB)2216,2217,2217
 2216 LE=8
      GO TO 222
 2217 LE=LC
  222 J=J+1
      TTT=AA+THR(J)+TMIN(J)/60.
 2221 IF(TTT-TNAV2)2251,225,225
 2251 IF(TTT-TNAV1)20,223,223
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      GDISK=GDIS*1.85325
      LGG=THR(J)*100.+TMIN(J)
      I=1
 3330 X=I*100
      IF(G(J)-X)3331,3331,3332
 3332 I=I+1
      GO TO 3330
 3331 IF(I-1)3333,3334,3333
 3334 GGC=G(J)*V(I)/800.+3.
      GO TO 3335
 3333 IF(V(I))3338,3339,3338
 3338 GGC=G(J)*(V(I)+(G(J)-X)*(V(I)-V(I-1))/100.)/800.+3.
       GO TO 3335
 3339 GGC=(G(J)*850./800.)+3.
       WRITE(5,752)
 3335 IGMC=GGC*1.829+.5
      IGGC=GGC+.5
      LGG=THR(J)*100.+TMIN(J)
      IGG=G(J)
      IF(IS3)501,502,501
  501 FA=IGMC
      FA=FA/10.
      GO TO 503
  502 FA=G(J)/10.
  503 JDM=(JDAY*1000)+MON
      CALL TROJ2(GLAT,GLONG,GDIS,FA,IND1,ANGLE,XMIN,XMAX,VLAT,VLON,IS2,
     1XKM,ZINCH,XSCAL,ZSCAL,FAC,SSPR,SSPU,SSPL)
      GO TO (18,6),IND1
   18 IF(J-LE)222,26,26
```

```
   26 IF(L-LB)221,402,402
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      M=M+1
      GO TO 9973
    6  WRITE(1,712)
  712 FORMAT(' LOAD NEW DATA  '/'  ADJUST PEN  ')
      IF(SSPL)201,21,201
  201 A1=XKM/XSCAL
      A2=A1+0.1
      DO 2011 JQJ=1,9
      XJQJ=JQJ
      HT=ZINCH-4.+XJQJ
      CALL FPLOT(1,A1,HT)
      CALL FPLOT(-2,A1 ,HT)
 2011 CALL FPLOT(-2,A2 ,HT)
      IF(XNEXT)2012,2013,2012
 2012 XNEXT=-XKM/XSCAL
 2013 CALL FPLOT(1,XNEXT,0.0)
   21 PAUSE
      GO TO 293
  702 FORMAT(5F10.5,2I5,3F5.0,I5)
  703 FORMAT(6F10.5)
  706 FORMAT(I3,I3,I5,F7.3,F8.3,F7.1,F8.1,6XF9.4,F9.4,F6.1,A4,F5.1)
  708 FORMAT(I5)
  752 FORMAT(47H 850 KM/SEC ASSUMED...MATHEW ZONE NOT INCLUDED )
  909 FORMAT(I2,I3,I5,F6.3,2X,I3,I2)
  910 FORMAT (8(F2.0,F2.0,F5.0,1X))
  911 FORMAT(20(F3.0,1X))
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2   THR(R )=003A-002A  TMIN(R )=004C-003C     G(R )=005E-004E     V(R )=00E6-0060
 ANGLE(R )=00E8       XMIN(R )=00EA       XMAX(R )=00EC       VLAT(R )=00EE       VLON(R )=00F0       SSPR(R )=00F2
  SSPU(R )=00F4       SSPL(R )=00F6        XKM(R )=00F8      ZINCH(R )=00FA      XSCAL(R )=00FC      ZSCAL(R )=00FE
   FAC(R )=0100      XNEXT(R )=0102       DISA(R )=0104       DMAX(R )=0106      CRUIS(R )=0108      TNAV1(R )=010A
 PLAT1(R )=010C      PLNG1(R )=010E       SETE(R )=0110         TZ(R )=0112        XXE(R )=0114        XXN(R )=0116
   XXD(R )=0118      TNAV2(R )=011A      PLAT2(R )=011C      PLNG2(R )=011E       DISB(R )=0120       DELT(R )=0122
 SPEED(R )=0124        DEN(R )=0126        DEM(R )=0128        EOT(R )=012A        FOT(R )=012C         AA(R )=012E
   TTT(R )=0130       GLAT(R )=0132      GLONG(R )=0134       GDIS(R )=0136      GDISK(R )=0138         X(R )=013A
   GGC(R )=013C         FA(R )=013E         A1(R )=0140         A2(R )=0142       XJQJ(R )=0144        HT(R )=0146
    KV(I )=018F-014C    JG(I )=0198-0190  JTIM(I )=01A1-0199  INXT(I )=01A2         KS(I )=01A3      NMZPR(I )=01A4
  IND1(I )=01A5         KB(I )=01A6         IS2(I )=01A7         IS3(I )=01A8         I(I )=01A9      JBSYR(I )=01AA
     M(I )=01AB       JDAY(I )=01AC        MON(I )=01AD        JYR(I )=01AE        LB(I )=01AF         LC(I )=01B0
   NMZ(I )=01B1         KT(I )=01B2        NQQ(I )=01B3       KNQQ(I )=01B4         L(I )=01B5       JJHR(I )=01B6
     J(I )=01B7         LE(I )=01B8        LGG(I )=01B9       IGMC(I )=01BA       IGGC(I )=01BB        IGG(I )=01BC
   JDM(I )=01BD        JQJ(I )=01BE

UNREFERENCED STATEMENTS
 8       85      706     708     909     910     911
```

```
STATEMENT ALLOCATIONS
 712  =01F2  702  =0205  703  =020D  706  =0210  708  =021E  752  =0220  909  =023A  910  =0242  911  =0249  293  =0267
 8    =0279  200  =0297  20   =02B1  7002 =02C5  7001 =02CC  7003 =02D0  9973 =02ED  402  =034C  4021 =036A  601  =0371
 603  =038A  602  =03A5  85   =03A9  221  =03B6  2399 =03F7  2216 =0421  2217 =0427  222  =042B  2221 =0444  2251 =044B
 223  =0452  3330 =048D  3332 =04A1  3331 =04A9  3334 =04B0  3333 =04CA  3338 =04D4  3339 =0507  3335 =051A  501  =0544
 502  =0551  503  =055C  18   =057F  26   =0586  225  =058F  6    =05A7  201  =05B0  2011 =05DC  2012 =05F4  2013 =05FB
 21   =0600

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    SCALF   COMDI   DELON   FCOS    TXX     TROJ2   FPLOT   FADDX   FSUB    FSUBX   FMPY    FMPYX   FDIV    FLD
 FLDX    FSTO    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   CARDZ   WCHRI   READZ   SRED
 SWRT    SCOMP   SFIO    SIOF    SIOI    SUBSC   PRNZ    PAUSE   SNR     SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .100000E 01=01C2    .000000E 00=01C4    .750000E-02=01C6    .114591E 03=01C8    .100000E 04=01CA    .600000E 02=01CC
  .185325E 01=01CE    .100000E 03=01D0    .800000E 03=01D2    .300000E 01=01D4    .850000E 03=01D6    .182900E 01=01D8
  .500000E 00=01DA    .100000E 02=01DC    .100000E 00=01DE    .400000E 01=01E0

INTEGER CONSTANTS
     0=01E2      1=01E3      8=01E4      3=01E5   1959=01E6   1970=01E7      2=01E8     12=01E9     68=01EA     14=01EB
    13=01EC    100=01ED      5=01EE   1000=01EF      9=01F0      0=01F1

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    450  PROGRAM   1090

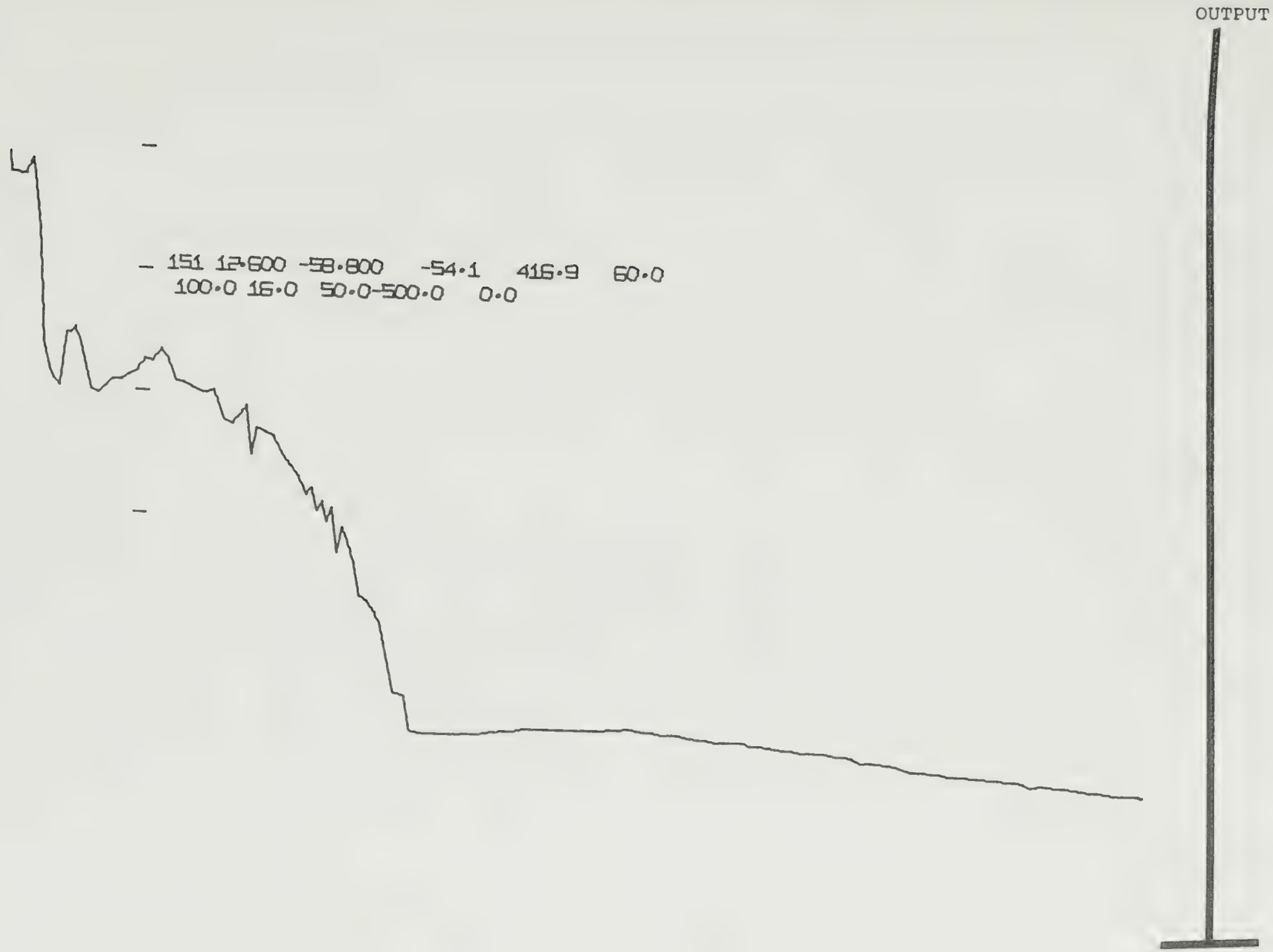
 END OF COMPILATION
```

CONTROL CARDS AND INPUT

```
// JOB    2005 3005
// XEQ NATS2    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
      60.     3700.     4100.      12.6     -58.8    1    0   1.   1.   1.    0
     100.       16.       50.      500.        0.        0.
```

OUTPUT

```
NO.POINTS=  151M.LAT=  12.600M.LONG=  -58.800XMIN=  -54.1XMAX=  416.9AZM=   60.
  -54.1     33  -53.4    115  -51.2    115  -49.0    125  -46.8    120  -44.7     60
  -43.2    120  -41.1    340  -39.6    600  -38.3    810  -36.2    910  -34.1    960
  -31.7    985  -29.1    770  -27.6    771  -25.4    750  -23.3    800  -21.1    900
  -18.5   1000  -15.5   1015  -12.5    985   -9.4    953   -6.2    953   -2.9    936
    0.2    913    3.4    870    6.7    880    9.9    830   13.2    868   16.4    960
   19.7    967   22.9    985   27.3   1007   31.9    990   36.4   1117   39.9   1130
   45.4   1055   47.9   1255   50.2   1147   53.6   1160   57.1   1180   60.5   1250
   64.0   1295   67.4   1340   70.9   1415   73.1   1387   75.4   1480   77.6   1440
   79.3   1523   81.6   1465   83.9   1650   85.9   1545   88.2   1595   90.8   1690
   93.5   1827   96.6   1845  100.1   1890  102.5   1943  108.6   2220  113.0   2235
  115.5   2375  119.3   2383  123.1   2383  126.9   2383  130.8   2383  134.6   2383
  138.4   2380  143.5   2380  146.0   2376  149.8   2371  153.6   2366  157.2   2365
  160.4   2360  162.4   2357  164.5   2356  168.3   2356  172.0   2355  175.7   2355
  179.3   2355  183.0   2355  186.6   2355  190.3   2353  193.9   2353  197.5   2351
  201.2   2351  204.8   2347  208.4   2353  212.0   2360  215.7   2360  219.3   2368
  222.9   2366  226.6   2368  230.2   2380  233.9   2385  237.5   2385  241.1   2395
  244.7   2388  248.3   2392  251.8   2392  255.3   2405  258.8   2406  262.3   2410
  265.8   2416  269.4   2420  272.9   2422  276.4   2430  279.9   2427  283.4   2432
  287.0   2432  290.5   2440  294.0   2442  297.6   2445  301.1   2463  304.6   2462
  308.2   2466  311.7   2472  315.2   2476  317.1   2480  318.7   2483  320.3   2488
  321.9   2493  323.5   2493  325.1   2495  326.8   2496  329.8   2500  333.3   2502
  336.7   2508  340.2   2510  343.7   2512  347.1   2515  350.6   2517  354.1   2518
  357.6   2522  360.9   2525  364.3   2527  367.8   2531  371.2   2546  374.6   2537
  378.1   2540  381.5   2543  384.9   2547  388.4   2552  391.8   2556  395.2   2560
  398.7   2562  402.1   2566  405.5   2570  409.0   2570  412.4   2570  415.5   2570
  416.9   2573
```


OUTPUT
151 12.600 -58.800 -54.1 416.9 60.0
100.0 16.0 50.0-500.0 0.0

CONTROL CARDS AND INPUT

```
// JOB    2005 3005
// XEQ NATS2    1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
       60.     4070.     4300.      13.7     -59.6    0    0   1.   1.   1.    0
      100.       19.       50.      500.        0.        0.
```

OUTPUT

```
NO.POINTS=   85M.LAT=  13.700M.LONG=  -59.600XMIN=  -27.1XMAX=  213.9AZM=   60.
  -27.1   295  -23.9   335  -21.3   466  -16.4   710  -14.3   626  -11.1   696
   -7.8   790   -4.6   843   -1.4   865    1.8   882    5.6   828    8.4   940
   12.0  1200   16.6  1600   19.5  1716   25.0  1500   27.6  1600   32.3  2000
   35.6  2185   38.2  2131   41.4  2108   45.6  1935   47.9  1990   50.5  1970
   52.6  1980   55.0  2080   59.3  1882   61.1  1912   62.8  1796   65.4  1762
   68.3  1730   71.5  1635   73.9  1595   74.7  1565   79.8  1745   82.8  1833
   85.1  1955   86.1  2000   91.6  2140   94.2  2252   95.9  2200   97.7  2196
  100.6  2050  103.8  2290  106.6  2290  109.2  2187  113.6  2000  116.8  1940
  118.0  2000  119.0  2160  121.7  2000  124.7  2065  127.7  2146  130.7  2277
  132.7  2332  136.8  2197  139.9  2137  143.4  2050  144.0  2160  146.1  2180
  149.2  2220  152.4  2305  155.1  2400  158.6  2630  161.3  2710  164.7  2602
  167.4  2710  170.5  2710  171.8  2661  173.7  2715  176.1  2701  178.9  2661
  181.7  2693  184.5  2761  187.3  2790  190.1  2807  192.9  2790  195.7  2817
  198.5  2787  201.2  2800  203.8  2857  206.5  2865  207.7  2845  209.1  2895
  213.9  2960
```

OUTPUT
85 13.700 -59.600 -27.1 213.9 60.0
100.0 19.0 50.0-500.0 0.0

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*LISTALL
*ONE WORD INTEGERS
*ARITHMETICTRACE
*TRANSFERTRACE
C TPDSK
C ADDITIONAL SUBROUTINE TRPL2
C TPDSK USES NAVIGATION DATA AND TOPOGRAPHY DATA ON DISK TO PRINT
C TOPOGRAPHY ANSWERS AND/OR PLOT DEPTH IN UNCORRECTED FATHOMS AGAINST
C NAUTICAL MILES.
C JPLOT=1 FOR PRELIMINARY PLOT
C JPLOT=2 FOR PREFINAL PLOT
C JPLOT=3 FOR PLOT AT ARBITRARY SCALE (FACG,FACD,ZINCH)
C JPLOT=4 DO NOT PLOT
C JPLOT=5 FINAL PLOT
C JPRNT=0 DO NOT PRINT
C PRELIMINARY PLOT IS AT FIXED SCALE OF 500 FATHOMS TO INCH AND 50 N.M.
C TO INCH.
C PLOT IS MADE BETWEEN XMIN AND XMAX MILES ALONG TRACK.
C IF XMIN=0, PROGRAM SETS XMIN=DISA(INITIAL NAVIGATION DISTANCE).
C IF XMAX=0, PROGRAM SETS XMAX=DMAX(FINAL NAVIGATION DISTANCE).
C KS TOPOGRAPHY DAYS ARE SKIPPED.
C LAST DAY USED IS KSLAS.
C HOWEVER IF KSLAS=0, PROGRAM SETS KSLAS=300.
C THE PRELIMINARY PLOT IS FOLDED(UNLESS XMAX IS LESS THAN 2000).
C THE ZEROS FOR THE TOPOGRAPHY SCALES ARE AT 13 AND 28 INCHES WHEN
C FOLDED FROM RIGHT EDGE OF PAPER.
C IF JN IS NONZERO A TRIANGLE IS PLOTTED AT EACH POINT.
C FOR PLOT AT ARBITRARY SCALE TOPOGRAPHY SCALE IS FACG FATHOMS TO INCH,
C DISTANCE SCALE IS FACD MILES TO INCH AND ZERO IS ZINCH INCHES FROM
C RIGHT EDGE.
C IGNORE SHIFT
C SHIFT IS NOT USED FOR TOPOGRAPHY PRE-FINAL AND FINAL PLOTS.
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 12(500,11,U,INXT)
      DEFINE FILE 13(2500,16,U,INXT)
      DEFINE FILE 14(3536,1,U,INXT)
      DIMENSION AM(12),AY(11),THR(9),TMIN(9),G(9),JTIM(9),JG(9),V(68)
     1,KV(68)
      COMMON AM,AY
      CALL AMAY
      NMZPR=0
      KS=0
```

```
      KB=1
      DDIS=-1.0
    8 READ(8,702)XMIN,XMAX,SHIFT,JPLOT,JPRNT,FACG,FACD,ZINCH,KS,KSLAS
     1,ITP,JN
      IF(KSLAS)501,501,502
  501 KSLAS=300
  502 CONTINUE
   20 READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      IF (JBSYR-1959)7001,7002,7002
 7002 IF (JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      IF(XMIN)53,53,61
   53 XMIN=DISA
   61 IF(XMAX)3,3,4
    3 XMAX=DMAX+1.
    4 LMAX2=XMAX/200
      AMAX2=LMAX2*100
   60 IF(XMAX-2000.)84,84,83
   84 AMAX2=6000.
      GO TO 62
   83 XF=XMAX
      MXF=XF
      JK=MXF/100
      JL=100*JK
      IF(JL-MXF)4100,4101,4101
 4100 MXF=JL+100
 4101 JX=MXF/2
      AMAX2=JX
   62 LMIN=XMIN/100.
      AMIN=LMIN*100
      CALL SCALF(1.,1.,0.,0.)
      CALL FPLOT(1,0.0,0.0)
      INDEX=1
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ
      XXE=0.
      XXN=0.
      XXD=0.
 9973 READ (1'M)TNAV2,PLAT2,PLNG2,SETE,TZ
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
      DEN=(PLAT2-PLAT1)/DELT
       DEM=DELON(PLNG2-PLNG1)/DELT
      EOT=.0075*(XXE/DELT)*FCOS((PLAT1+PLAT2)/114.59156)
      FOT=1000.*EOT
      GO TO(402,2221),KB
  402 KS=KS+1
      IF(KS-KSLAS)504,504,699
```

```
 699 JDAY=0
     GO TO 996
 504 CONTINUE
     READ(12'KS)JDAY,MON,JYR,TZ,LB,LC,NMZ,KT
     IF(JDAY)996,996,4021
4021 IF(NMZ-NMZPR)601,602,601
 601 DO 603 NQQ=1,68
     KNQQ=(NMZ-1)*68+NQQ
     READ(14'KNQQ)KV(NQQ)
 603 V(NQQ)=KV(NQQ)
      NMZPR=NMZ
 602 CONTINUE
     KB=2
  85 L=0
     AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
 221 KT=KT+1
     READ(13'KT)(JTIM(I),JG(I),I=1,8)
     DO 2399 I=1,8
     JJHR=JTIM(I)/100
     THR(I)=JJHR
     G(I)=JG(I)
2399 TMIN(I)=JTIM(I)-JJHR*100
     J=0
     L=L+1
     IF(L-LB)2216,2217,2217
2216 LE=8
     GO TO 222
2217 LE=LC
 222 J=J+1
     TTT=AA+THR(J)+TMIN(J)/60.
2221 IF(TTT-TNAV2)2251,223,225
2251 IF(TTT-TNAV1)20,223,223
 223 GLAT=PLAT1+(TTT-TNAV1)*DEN
     GLONG=PLNG1+(TTT-TNAV1)*DEM
     GLONG=DELON(GLONG)
     GDIS=DISA+SPEED*(TTT-TNAV1)
     GDISK=GDIS*1.85325
     RLAT=GLAT/57.29578
     LGG=THR(J)*100.+TMIN(J)
     JDM=(JDAY*1000)+MON
       I=1
3330 X=I*100
     IF(G(J)-X)3331,3331,3332
3332 I=I+1
     GO TO 3330
3331 IF(I-1)3333,3334,3333
3334 GGC=G(J)*V(I)/800.+3.
     GO TO 3335
3333 IF(V(I))3338,3339,3338
3338 GGC=G(J)*(V(I)+(G(J)-X)*(V(I)-V(I-1))/100.)/800.+3.
     GO TO 3335
```

```
 3339 GGC=(G(J)*850./800.)+3.
      WRITE(5,752)
 3335 IGMC=GGC*1.829+.5
      IGGC=GGC+.5
      LGG=THR(J)*100.+TMIN(J)
      IGGG=G(J)
 9002 IF(ITP)9001,9000,9001
 9000 FA=-IGGG
       GO TO 996
 9001 FA=-IGMC
  996       CALL TRPL2(XMIN,XMAX,AMIN,AMAX2,SHIFT,JPLOT,JPRNT,JDAY,MON,
     1LGG,GLAT,GLONG,GDIS,GDISK,IGGG,IGGC,IGMC,CRUIS,DMAX,FACD,FACG,FA,
     2ZINCH,INDEX,JYR,JN,DDIS)
       IF(JDAY)18,6,18
   18 IF(J-LE)222,26,26
   26 IF(L-LB)221,402,402
  225 DISA=DISB
      PLAT1=PLAT2
      PLNG1=PLNG2
      TNAV1=TNAV2
      M=M+1
      GO TO 9973
    6 IF(JPLOT-2)37,38,37
   38 Y1=(SHIFT/100.)+14.
      Y2=Y1-5.8
      X2=(GDIS-AMIN)/100.
      CALL FPLOT(1,X2,Y1)
      CALLFPLOT(2,X2,Y1)
      CALL FPLOT(0,X2,Y2)
      CALL FPLOT(0,0.0,Y2)
      CALL FPLOT(0,0.0,Y1)
      CALL FPLOT(0,X2,Y1)
      CALL FPLOT(1,X2,Y1)
   37 CALL EXIT
  702 FORMAT(3F10.5,2I5,3F10.5,I3,I3,I2,I2)
  752 FORMAT(47H 850 KM/SEC ASSUMED...MATHEW ZONE NOT INCLUDED )
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2   THR(R )=0034-0024  TMIN(R )=0046-0036     G(R )=0058-0048     V(R )=00E0-005A
  DDIS(R )=00E2       XMIN(R )=00E4       XMAX(R )=00E6      SHIFT(R )=00E8       FACG(R )=00EA       FACD(R )=00EC
 ZINCH(R )=00EE       DISA(R )=00F0       DMAX(R )=00F2      CRUIS(R )=00F4      AMAX2(R )=00F6         XF(R )=00F8
  AMIN(R )=00FA      TNAV1(R )=00FC      PLAT1(R )=00FE      PLNG1(R )=0100       SETE(R )=0102         TZ(R )=0104
   XXE(R )=0106        XXN(R )=0108        XXD(R )=010A      TNAV2(R )=010C      PLAT2(R )=010E      PLNG2(R )=0110
  DISB(R )=0112       DELT(R )=0114      SPEED(R )=0116        DEN(R )=0118        DEM(R )=011A        EOT(R )=011C
   FOT(R )=011E         AA(R )=0120        TTT(R )=0122       GLAT(R )=0124      GLONG(R )=0126       GDIS(R )=0128
 GDISK(R )=012A       RLAT(R )=012C          X(R )=012E        GGC(R )=0130         FA(R )=0132         Y1(R )=0134
    Y2(R )=0136         X2(R )=0138       JTIM(I )=0146-013E    JG(I )=014F-0147    KV(I )=0193-0150  INXT(I )=0194
 NMZPR(I )=0195         KS(I )=0196         KB(I )=0197      JPLOT(I )=0198      JPRNT(I )=0199      KSLAS(I )=019A
   ITP(I )=019B         JN(I )=019C          I(I )=019D      JBSYR(I )=019E      LMAX2(I )=019F         MXF(I )=01A0
    JK(I )=01A1         JL(I )=01A2         JX(I )=01A3       LMIN(I )=01A4      INDEX(I )=01A5          M(I )=01A6
  JDAY(I )=01A7        MON(I )=01A8        JYR(I )=01A9         LB(I )=01AA         LC(I )=01AB        NMZ(I )=01AC
```

```
    KT(I )=01AD        NQQ(I )=01AE       KNQQ(I )=01AF          L(I )=01B0       JJHR(I )=01B1          J(I )=01B2
    LE(I )=01B3        LGG(I )=01B4        JDM(I )=01B5       IGMC(I )=01B6       IGGC(I )=01B7       IGGG(I )=01B8

UNREFERENCED STATEMENTS
 60      85      9002

STATEMENT ALLOCATIONS
 702  =01F0  752  =01FB  8    =0241  501  =0261  502  =0265  20   =0265  7002 =0279  7001 =0280  7003 =0284  53   =0289
 61   =028D  3    =0292  4    =0298  60   =02A8  84   =02AF  83   =02B5  4100 =02D3  4101 =02D9  62   =02E5  9973 =0320
 402  =037F  699  =038C  504  =0392  4021 =03AA  601  =03B1  603  =03CA  602  =03E5  85   =03E9  221  =03F6  2399 =0437
 2216 =0461  2217 =0467  222  =046B  2221 =0484  2251 =048D  223  =0494  3330 =04DE  3332 =04F2  3331 =04FA  3334 =0501
 3333 =051B  3338 =0525  3339 =0558  3335 =056B  9002 =0590  9000 =0595  9001 =059D  996  =05A3  18   =05C5  26   =05CC
 225  =05D5  6    =05ED  38   =05F4  37   =062D

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 AMAY    SCALF   FPLOT   COMDI   DELON   FCOS    TXX     TRPL2   FADDX   FSUB    FSUBX   FMPY    FMPYX   FDIV    FLD
 FLDX    FSTO    FDVR    SFAR    SFARX   SIAR    IFIX    FLOAT   TYPEZ   SIIF    SFIF    SGOTO   WCHRI   READZ   SRED
 SWRT    SCOMP   SFIO    SIOF    SIOI    SUBSC   PRNZ    SNR     SDFIO   SDRED   SDIX    SDF     SDI

REAL CONSTANTS
  .100000E 01=01BC    .200000E 04=01BE    .600000E 04=01C0    .100000E 03=01C2    .000000E 00=01C4    .750000E-02=01C6
  .114591E 03=01C8    .100000E 04=01CA    .600000E 02=01CC    .185325E 01=01CE    .572957E 02=01D0    .800000E 03=01D2
  .300000E 01=01D4    .850000E 03=01D6    .182900E 01=01D8    .500000E 00=01DA    .140000E 02=01DC    .580000E 01=01DE

INTEGER CONSTANTS
     0=01E0      1=01E1      8=01E2    300=01E3      3=01E4   1959=01E5   1970=01E6    200=01E7    100=01E8      2=01E9
    12=01EA     68=01EB     14=01EC     13=01ED   1000=01EE      5=01EF

CORE REQUIREMENTS FOR
 COMMON     46  VARIABLES    444  PROGRAM   1138

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*LISTALL
*TRANSFERTRACE
*ARITHMETICTRACE
*ONE WORD INTEGERS
C TRPL2
      SUBROUTINE TRPL2(XMIN,XMAX,AMIN,AMAX2,SHIFT,JPLOT,JPRNT,JDAY,MON,
     1LGG,GLAT,GLONG,GDIS,GDISK,IGGG,IGGC,IGMC,CRUIS,DMAX,FACD,FACG,FA,
     2ZINCH,INDEX,JYR,JN,DDIS)
      DIMENSION G(700),R(700)
    4 IF(GDIS-XMIN)2,52,52
   52 IF(GDIS-XMAX)5,5,2
    5 IF(INDEX-1)50,51,50
   51 L=0
      KDAY=JDAY
      GO TO 202
   50 IF(JDAY-KDAY)201,202,201
  202 L=L+1
      INDEX=2
      G(L)=GDIS
      R(L)=FA
      GO TO 40
  201 DO 17 M=1,L
      GDIT=G(M)
      FB=R(M)
  923 GO TO(11,20,30,924,5005),JPLOT
   11 IF(GDIT-AMAX2)16,16,13
   13 X=(GDIT-AMAX2)/50.
      Y=(FB/500.)+28.
      GO TO 14
   16 X=(GDIT-AMIN)/50.
      Y=(FB/500.)+13.
      GO TO 14
   20 X=(GDIT-AMIN)/100.
      Y=((FB+SHIFT)/1000.)+14.0
      GO TO 14
   30 X=(GDIT-AMIN)/FACD
      Y=(FB/FACG)+ZINCH
      GO TO 14
   14 CALL FPLOT(-2,X,Y)
      IF(JN)141,17,141
  141 YY=Y+.04
      X1=X+.02
      X2=X-.02
      CALL FPLOT(0,X1,YY)
```

```
      CALL FPLOT(0,X2,YY)
      CALL FPLOT(0,X,Y)
      GO TO 17
 5005 IF(DDIS+1.)520,5000,520
 5000 CALL SCALF(0.05,0.005,0.0,0.0)
      N3=XMIN/600.
  601 XONE=N3*600.+60.
      XTWO=N3*600.+70.
      XXONE=N3*600.
      IF(DDIS+1.0)8001,8000,8001
 8001 CALL FPLOT(1,XXONE,0.0)
 8000 CALL SCALF(0.05,0.005,XXONE,0.0)
      CALL FPLOT(1,XONE,5400.)
      DO 5163 K=1,14
      AK=K
      Y=5400.-(AK-1.)*400.
      CALL FPLOT(-2,XONE,Y)
      CALL FPLOT(-1,XTWO,Y)
      III=0
 5163 CONTINUE
      N3=N3+1
  520 IF(-FB-5800.)521,521,522
  522 FB=-FB-5800.
      GO TO 520
  521 Y=5800.+FB
      IF(GDIT)17,526,526
  526 IF(GDIT-N3*600.)5166,5166,601
 5166 IF(GDIT-XMIN)17,518,518
  518 IF(GDIT-XMAX)519,519,2
  519 IF((GDIT-DDIS)-13.)5191,5190,5190
 5190 CALL FPLOT(1,GDIT,Y)
      GO TO 102
 5191 IF(III)103,102,103
  102 CALL FPLOT(-2,GDIT,Y)
      III=III+1
      GO TO 104
  103 CALL FPLOT(0,GDIT,Y)
  104 DDIS=GDIT
   17 CONTINUE
  924 L=0
      KDAY=JDAY
         IF(JDAY)50,2,50
   40 IF(JPRNT)45,2,45
   45 WRITE(5,706)JDAY,MON,LGG,GLAT,GLONG,GDIS,GDISK,IGGG,IGGC,IGMC,
     1CRUIS,JYR
  706 FORMAT(I3,I3,I6,F8.3,F10.3,F9.1,F9.1,I7,I7,I8,1XA4,I5)
    2 RETURN
      END
VARIABLE ALLOCATIONS
     G(R )=0576-0000     R(R )=0AEE-0578  GDIT(R )=0AF0        FB(R )=0AF2        X(R )=0AF4        Y(R )=0AF6
    YY(R )=0AF8        X1(R )=0AFA        X2(R )=0AFC      XONE(R )=0AFE      XTWO(R )=0B00     XXONE(R )=0B02
```

```
    AK(R )=0B04          L(I )=0B08       KDAY(I )=0B09          M(I )=0B0A         N3(I )=0B0B          K(I )=0B0C
   III(I )=0B0D

UNREFERENCED STATEMENTS
 923

STATEMENT ALLOCATIONS
 706  =0B3B  4    =0B92  52   =0B99  5    =0BA0  51   =0BA7  50   =0BB1  202  =0BB8  201  =0BD3  923  =0BE6  11   =0BEE
 13   =0BF5  16   =0C07  20   =0C19  30   =0C2D  14   =0C3F  141  =0C4E  5005 =0C71  5000 =0C78  601  =0C85  8001 =0CA5
 8000 =0CAA  5163 =0CE0  520  =0CEF  522  =0CF7  521  =0D00  526  =0D0B  5166 =0D15  518  =0D1C  519  =0D23  5190 =0D2C
 5191 =0D33  102  =0D38  103  =0D4A  104  =0D4F  17   =0D53  924  =0D5C  40   =0D6B  45   =0D70  2    =0D8C

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FPLOT   SCALF   FSUB    FMPY    FDIV    FLD     FLDX    FSBR    SFAR    SFARX   SIAR    IFIX    FLOAT   SIIF    SFIF
 SGOTO   SWRT    SCOMP   SIOF    SIOI    SUBSC   SNR     SUBIN

REAL CONSTANTS
  .500000E 02=0B10    .500000E 03=0B12    .280000E 02=0B14    .130000E 02=0B16    .100000E 03=0B18    .100000E 04=0B1A
  .140000E 02=0B1C    .400000E-01=0B1E    .200000E-01=0B20    .100000E 01=0B22    .500000E-01=0B24    .500000E-02=0B26
  .000000E 00=0B28    .600000E 03=0B2A    .600000E 02=0B2C    .700000E 02=0B2E    .540000E 04=0B30    .400000E 03=0B32
  .580000E 04=0B34

INTEGER CONSTANTS
     1=0B36      0=0B37      2=0B38     14=0B39      5=0B3A

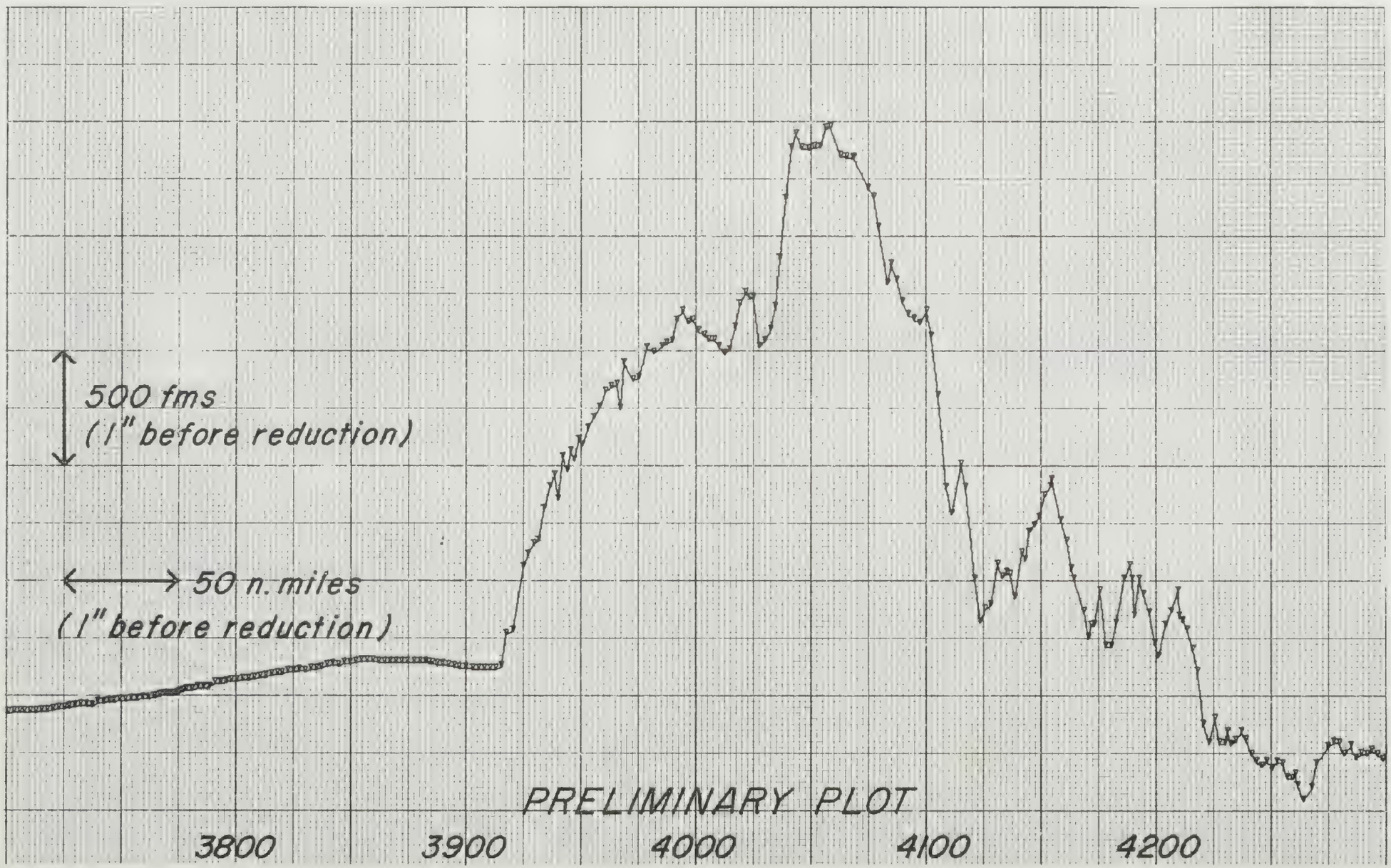
CORE REQUIREMENTS FOR TRPL2
 COMMON      0  VARIABLES   2832  PROGRAM    638

 END OF COMPILATION
```

```
// JOB     2005 3005
// XEQ TPDSK     1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
     3700.     4500.        0.    1    1      500.       50.        0.  0  0 0 1
```

CONTROL CARDS AND INPUT

OUTPUT



Only the first and last pages of TPDSK output are given here.

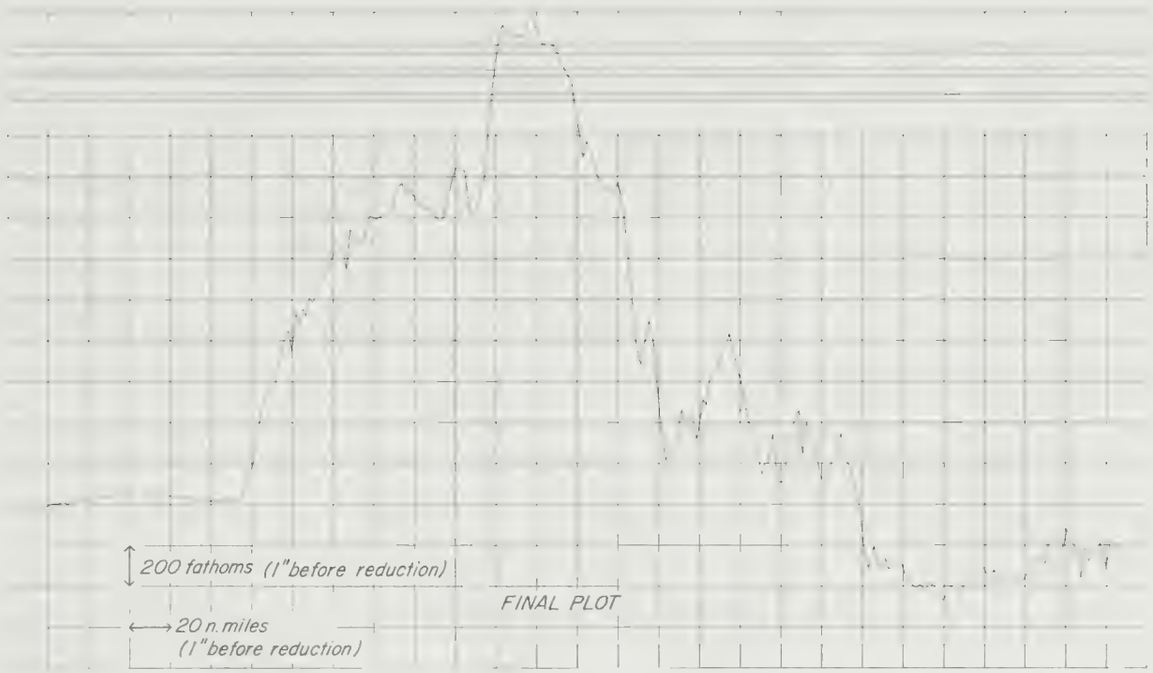
5	12	1645	11.768	-53.885	3701.0	6858.9	2574	2653	4853	V24	1967
5	12	1700	11.808	-53.885	3703.4	6863.4	2569	2648	4843	V24	1967
5	12	1715	11.814	-53.926	3705.9	6867.9	2570	2649	4845	V24	1967
5	12	1730	11.821	-53.964	3708.1	6872.1	2570	2649	4845	V24	1967
5	12	1745	11.828	-54.004	3710.5	6876.6	2570	2649	4845	V24	1967
5	12	1800	11.836	-54.045	3713.0	6881.1	2570	2649	4845	V24	1967
5	12	1815	11.844	-54.086	3715.4	6885.7	2567	2646	4839	V24	1967
5	12	1830	11.852	-54.127	3717.9	6890.2	2563	2642	4832	V24	1967
5	12	1845	11.859	-54.168	3720.3	6894.7	2560	2639	4826	V24	1967
5	12	1900	11.867	-54.209	3722.8	6899.3	2557	2635	4820	V24	1967
5	12	1915	11.875	-54.250	3725.2	6903.8	2553	2631	4812	V24	1967
5	12	1930	11.883	-54.291	3727.7	6908.3	2548	2626	4803	V24	1967
5	12	1945	11.890	-54.332	3730.1	6912.8	2544	2622	4795	V24	1967
5	12	2000	11.898	-54.373	3732.5	6917.4	2541	2618	4789	V24	1967
5	12	2015	11.906	-54.413	3735.0	6921.9	2538	2615	4783	V24	1967
5	12	2030	11.913	-54.454	3737.4	6926.4	2547	2625	4801	V24	1967
5	12	2045	11.921	-54.495	3739.9	6931.0	2532	2609	4772	V24	1967
5	12	2100	11.929	-54.536	3742.3	6935.5	2528	2605	4764	V24	1967
5	12	2115	11.937	-54.577	3744.8	6940.0	2525	2601	4758	V24	1967
5	12	2130	11.944	-54.617	3747.1	6944.4	2523	2599	4754	V24	1967
5	12	2145	11.952	-54.658	3749.6	6949.0	2519	2595	4746	V24	1967
5	12	2200	11.960	-54.699	3752.1	6953.6	2518	2594	4744	V24	1967
5	12	2215	11.968	-54.741	3754.6	6958.2	2515	2591	4739	V24	1967
5	12	2230	11.975	-54.782	3757.0	6962.7	2513	2589	4735	V24	1967
5	12	2245	11.983	-54.823	3759.5	6967.3	2511	2587	4731	V24	1967
5	12	2300	11.991	-54.865	3762.0	6971.9	2509	2584	4727	V24	1967
5	12	2315	11.999	-54.906	3764.4	6976.5	2503	2578	4715	V24	1967
5	12	2330	12.007	-54.947	3766.9	6981.0	2500	2575	4709	V24	1967
5	12	2345	12.013	-54.983	3769.1	6985.1	2497	2572	4704	V24	1967
5	12	2400	12.020	-55.005	3770.4	6987.5	2495	2570	4700	V24	1967
5	12	2315	12.026	-55.026	3771.7	6989.9	2494	2569	4698	V24	1967
5	12	2330	12.033	-55.047	3773.0	6992.3	2494	2569	4698	V24	1967
5	12	2345	12.040	-55.067	3774.3	6994.7	2489	2564	4689	V24	1967
5	12	2400	12.047	-55.088	3775.5	6997.1	2484	2558	4679	V24	1967
6	12	15	12.053	-55.109	3776.8	6999.5	2480	2554	4672	V24	1967
6	12	30	12.061	-55.133	3778.3	7002.2	2477	2551	4666	V24	1967
6	12	45	12.068	-55.175	3780.8	7006.8	2473	2547	4659	V24	1967
6	12	100	12.076	-55.217	3783.3	7011.4	2467	2541	4647	V24	1967
6	12	115	12.083	-55.258	3785.8	7016.0	2463	2537	4640	V24	1967
6	12	130	12.090	-55.300	3788.2	7020.6	2464	2538	4642	V24	1967
6	12	145	12.097	-55.342	3790.7	7025.2	2446	2519	4608	V24	1967
6	12	200	12.105	-55.383	3793.2	7029.8	2443	2516	4602	V24	1967
6	12	215	12.112	-55.425	3795.7	7034.4	2440	2513	4597	V24	1967
6	12	230	12.119	-55.467	3798.2	7039.0	2433	2506	4583	V24	1967
6	12	245	12.126	-55.509	3800.7	7043.7	2433	2506	4583	V24	1967
6	12	300	12.134	-55.550	3803.2	7048.3	2428	2501	4574	V24	1967
6	12	315	12.141	-55.592	3805.6	7052.8	2430	2503	4578	V24	1967
6	12	330	12.148	-55.633	3808.1	7057.4	2423	2496	4565	V24	1967
6	12	345	12.154	-55.674	3810.5	7061.9	2421	2494	4561	V24	1967
6	12	400	12.160	-55.715	3813.0	7066.4	2417	2489	4553	V24	1967
6	12	415	12.166	-55.756	3815.4	7070.9	2411	2483	4542	V24	1967
6	12	430	12.171	-55.796	3817.8	7075.3	2407	2479	4534	V24	1967

9	12	630	17.625	-61.027	4409.2	8171.3	2455	2535	4636	V24	1967
9	12	645	17.647	-61.062	4411.6	8175.8	2457	2537	4640	V24	1967
9	12	700	17.670	-61.097	4414.0	8180.3	2446	2525	4619	V24	1967
9	12	715	17.693	-61.132	4416.4	8184.8	2475	2555	4674	V24	1967
9	12	729	17.714	-61.165	4418.7	8189.0	2526	2609	4771	V24	1967
9	12	741	17.732	-61.193	4420.6	8192.6	2400	2478	4532	V24	1967
9	12	800	17.761	-61.236	4423.6	8198.2	2145	2211	4044	V24	1967
9	12	809	17.775	-61.256	4425.1	8200.8	2170	2237	4092	V24	1967
9	12	814	17.783	-61.267	4425.8	8202.2	2235	2305	4216	V24	1967
9	12	820	17.792	-61.281	4426.8	8204.0	2197	2266	4144	V24	1967
9	12	829	17.806	-61.301	4428.2	8206.6	2197	2266	4144	V24	1967
9	12	835	17.815	-61.314	4429.1	8208.4	2230	2300	4207	V24	1967
9	12	846	17.826	-61.330	4430.3	8210.4	2166	2233	4084	V24	1967
9	12	900	17.837	-61.346	4431.4	8212.5	2236	2306	4218	V24	1967
9	12	915	17.860	-61.379	4433.7	8216.9	2212	2281	4173	V24	1967
9	12	930	17.883	-61.413	4436.1	8221.2	2209	2278	4167	V24	1967
9	12	945	17.906	-61.446	4438.5	8225.6	2210	2279	4169	V24	1967
9	12	1000	17.929	-61.480	4440.8	8230.0	2209	2278	4167	V24	1967
9	12	1015	17.952	-61.513	4443.2	8234.4	2162	2229	4077	V24	1967
9	12	1033	17.980	-61.554	4446.0	8239.6	2015	2076	3797	V24	1967
9	12	1040	17.990	-61.569	4447.1	8241.6	2055	2117	3872	V24	1967
9	12	1049	18.004	-61.589	4448.5	8244.3	2000	2061	3769	V24	1967
9	12	1100	18.021	-61.614	4450.3	8247.5	1810	1863	3407	V24	1967
9	12	1114	18.043	-61.645	4452.5	8251.6	1600	1645	3009	V24	1967
9	12	1130	18.066	-61.685	4455.2	8256.6	1476	1516	2773	V24	1967
9	12	1156	18.105	-61.753	4459.7	8264.9	2000	2061	3769	V24	1967
9	12	1215	18.133	-61.803	4463.0	8271.1	2250	2321	4244	V24	1967
9	12	1230	18.155	-61.843	4465.6	8275.9	2482	2563	4687	V24	1967
9	12	1243	18.175	-61.877	4467.9	8280.2	2348	2423	4431	V24	1967
9	12	1300	18.200	-61.922	4470.9	8285.7	2178	2246	4107	V24	1967
9	12	1330	18.245	-62.002	4476.1	8295.4	2544	2628	4806	V24	1967
9	12	1345	18.267	-62.041	4478.7	8300.3	2622	2711	4958	V24	1967
9	12	1400	18.289	-62.081	4481.4	8305.1	2674	2766	5060	V24	1967
9	12	1415	18.312	-62.120	4484.0	8310.0	2718	2813	5144	V24	1967
9	12	1430	18.334	-62.160	4486.6	8314.9	2741	2837	5188	V24	1967
9	12	1445	18.356	-62.200	4489.2	8319.7	2783	2880	5267	V24	1967
9	12	1500	18.379	-62.239	4491.9	8324.6	2410	2488	4551	V24	1967
9	12	1501	18.380	-62.242	4492.0	8324.9	2400	2478	4532	V24	1967
9	12	1516	18.403	-62.282	4494.7	8329.8	2048	2110	3859	V24	1967
9	12	1528	18.420	-62.313	4496.8	8333.7	2000	2061	3769	V24	1967
9	12	1537	18.432	-62.335	4498.2	8336.3	1600	1645	3009	V24	1967

CONTROL CARDS AND INPUT

```
// JOB     2005 3005
// XEQ TPDSK     1
*FILES(1,B2413),(3,A2413),(10,C2413),(11,D2413),(12,E2413),(13,F2413),(14,MATZ)
     3800.     4500.       0.0    5    0       0.0       0.0       0.0  0  0 0 0
```

OUTPUT



```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*ONE WORD INTEGERS
C CCF1
C CCF1 TO PUT POLYNOMIAL COEFFICIENTS FOR REGIONAL MAGNETICS ON DISK AS
C FILE CF1 OR CF2
      DEFINE FILE 7(66,12,U,INXT)
      DIMENSION SHMIT(66),G(66),H(66),GT(66),HT(66),GTT(66),HTT(66)
    1 SHMIT(1)=-1.0
      II=1
      KK=1
      DUMY=SHMIT(1)
      DO 20 K=2,11
      AJ=2.
      FLN=K
      KK=K+KK-1
      JKK=KK
      SHMIT(JKK)=DUMY*((2.*FLN)-3.)/(FLN-1.)
      DUMY=SHMIT(JKK)
      II=II+1
      DO 20 J=2,II
      FLM=J
      JKK=KK+J-1
      SHMIT(JKK)=SHMIT(JKK-1)*FSQRT((FLN-FLM+1.0)*AJ/(FLN+FLM-2.0))
   20 AJ=1.0
      NMAX=0
      JKK=2
   25 READ(8,2)N,M,GNM,HNM,GTNM,HTNM,GTTNM,HTTNM
      WRITE(5,1111)GNM,HNM,GTNM,HTNM,GTTNM,HTTNM
    2 FORMAT(2I3,6F11.4)
      IF(N)40,3,40
   40 NMAX=N
      G(JKK)=GNM*SHMIT(JKK)
      H(JKK)=HNM*SHMIT(JKK)
      GT(JKK)=GTNM*SHMIT(JKK)
      HT(JKK)=HTNM*SHMIT(JKK)
      GTT(JKK)=GTTNM*SHMIT(JKK)
      HTT(JKK)=HTTNM*SHMIT(JKK)
      WRITE(7'JKK)G(JKK),H(JKK),GT(JKK),HT(JKK),GTT(JKK),HTT(JKK)
 1111 FORMAT(6F15.5)
      JKK=JKK+1
      GO TO 25
    3 CALL EXIT
      END
VARIABLE ALLOCATIONS
 SHMIT(R )=008A-0008     G(R )=010E-008C     H(R )=0192-0110     GT(R )=0216-0194     HT(R )=029A-0218     GTT(R )=031E-0[illegible]C
```

```
   HTT(R )=03A2-0320  DUMY(R )=03A4        AJ(R )=03A6        FLN(R )=03A8        FLM(R )=03AA        GNM(R )=03AC
   HNM(R )=03AE       GTNM(R )=03B0       HTNM(R )=03B2      GTTNM(R )=03B4      HTTNM(R )=03B6      INXT(I )=03BC
    II(I )=03BD         KK(I )=03BE          K(I )=03BF        JKK(I )=03C0          J(I )=03C1      NMAX(I )=03C2
     N(I )=03C3          M(I )=03C4

STATEMENT ALLOCATIONS
 2    =03D5  1111 =03DA  1    =03F6  20   =0481  25   =049F  40   =04C6  3    =0517

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 FSQRT   FSUB    FMPY    FMPYX   FLD     FLDX    FSTO    FSTOX   FDVR    FLOAT   TYPEZ   CARDZ   WCHRI   READZ   SRED
 SWRT    SCOMP   SFIO    SIOF    SIOI    SUBSC   PRNZ    SNR     SDFIO   SDWRT   SDCOM   SDFX

REAL CONSTANTS
  .100000E 01=03C8    .200000E 01=03CA    .300000E 01=03CC

INTEGER CONSTANTS
     1=03CE      2=03CF      11=03D0      0=03D1      8=03D2      5=03D3      7=03D4

CORE REQUIREMENTS FOR
 COMMON      0  VARIABLES    968  PROGRAM    336

 END OF COMPILATION
```

CONTROL CARDS AND INPUT

```
// JOB
// DUP
*STORE DATA  WS  UA  CF1      3
// XEQ CCF1     1
*FILES(7,CF1)
```

2	1	-30401.2000	0.0000	14.0300	0.0000	-.0620	0.0000
2	2	-2163.8000	5778.2000	8.7600	-3.7100	.1140	-.0430
3	1	-1540.1000	0.0000	-23.2900	0.0000	-.1540	0.0000
3	2	2997.9000	-1932.0000	-.0900	-14.3100	-.0180	.0540
3	3	1590.3000	202.9000	-4.5600	-16.6200	-.2530	-.0160
4	1	1307.1000	0.0000	-.9300	0.0000	-.1230	0.0000
4	2	-1988.9000	-425.4000	-10.6200	5.2000	-.0270	.0950
4	3	1276.8000	227.8000	2.3100	2.5300	.0280	-.0070
4	4	881.2000	-133.8000	-5.8900	-6.9800	-.1830	.0790
5	1	949.3000	0.0000	1.4500	0.0000	.0010	0.0000
5	2	803.5000	160.3000	.9000	-2.1900	-.0440	.0040
5	3	502.9000	-274.3000	-1.7500	-.1400	.0170	.0560
5	4	-397.7000	2.3000	.6600	1.8800	.0070	-.0350
5	5	266.5000	-246.6000	-3.0100	-6.5200	-.0970	-.0470
6	1	-233.5000	0.0000	1.6100	0.0000	.0450	0.0000
6	2	355.7000	5.1000	.6000	2.2400	.0010	-.0460
6	3	228.4000	117.8000	3.3400	1.5900	.0750	.0070
6	4	-28.8000	-114.8000	-.0400	-2.6100	.0080	-.0070
6	5	-157.9000	-108.9000	-.6000	.5000	.0150	.0010
6	6	-62.2000	82.4000	1.7600	-.1200	.0560	-.0240
7	1	49.2000	0.0000	-.4200	0.0000	-.0060	0.0000
7	2	57.5000	-12.1000	.8200	.0500	.0150	.0200
7	3	-.8000	104.4000	.8200	.0900	.0100	-.0110
7	4	-238.3000	56.6000	2.3500	2.5500	.0500	.0150
7	5	-1.5000	-23.4000	.8300	-1.1900	-.0110	-.0290
7	6	-2.0000	-14.8000	.0100	.3300	.0260	.0290
7	7	-108.9000	-13.3000	.2300	.8400	.0230	-.0100
8	1	72.2000	0.0000	-.5700	0.0000	-.0140	0.0000
8	2	-53.7000	-53.7000	-.3400	-.9600	-.0060	-.0140
8	3	7.9000	-27.4000	-1.4400	.0100	-.0340	.0160
8	4	15.6000	-8.1000	-.9000	.4300	-.0040	.0140
8	5	-24.3000	7.0000	.0300	.7500	-.0060	.0050
8	6	-3.6000	24.3000	-.6000	-.3300	-.0270	-.0080
8	7	15.5000	-22.5000	-.1700	.4900	-.0010	.0160
8	8	3.6000	-21.4000	-.6400	.9000	-.0040	.0110
9	1	8.5000	0.0000	.3500	0.0000	.0060	0.0000
9	2	6.5000	5.4000	.5000	-.5000	.0080	-.0150
9	3	-9.3000	-11.7000	1.7000	-.2100	.0390	-.0120
9	4	-9.6000	4.2000	-.1100	.0300	-.0080	.0050
9	5	-6.1000	-15.3000	.3400	-.7900	.0150	-.0110
9	6	5.5000	4.6000	-.0700	.0500	-.0020	0.0000
9	7	-8.1000	21.9000	.4300	.1000	.0050	-.0030
9	8	13.0000	-.7000	-.1500	-.3600	-.0080	-.0090

9	9	7.4000	-17.1000	-.4200	-.4300	-.0070	-.0030
10	1	10.4000	0.0000	-.1000	0.0000	-.0050	0.0000
10	2	5.8000	-22.4000	-.1300	.6600	-.0010	.0220
10	3	7.5000	13.8000	-1.2000	.5400	-.0270	.0070
10	4	-15.1000	6.3000	.0800	.0300	.0050	-.0020
10	5	12.1000	-3.0000	-.0800	.3500	-.0070	.0090
10	6	4.7000	-1.9000	-.3900	-.0300	-.0060	.0060
10	7	.2000	9.0000	-.3600	-.0100	-.0090	-.0010
10	8	1.6000	11.5000	.4700	.4500	.0060	.0090
10	9	.9000	.1000	.3700	-.0500	.0050	-.0040
10	10	.2000	-1.5000	-.4600	.7500	-.0090	.0190
11	1	-2.9000	0.0000	-.0100	0.0000	-.0030	0.0000
11	2	-.9000	-.1000	-.1300	-.6100	-.0030	-.0120
11	3	-2.2000	4.5000	.8800	-.6400	.0200	-.0140
11	4	.8000	-1.0000	-.1800	.0200	-.0080	.0010
11	5	-2.8000	2.6000	.1700	.0500	.0070	.0010
11	6	6.4000	-4.4000	-.0200	-.6300	.0010	-.0110
11	7	4.7000	-1.3000	.0500	-.0700	.0010	-.0010
11	8	-.2000	-3.6000	.1700	.0700	.0010	.0010
11	9	1.8000	4.0000	.1600	-.0300	.0050	-.0010
11	10	2.0000	1.0000	.3100	-.0200	.0040	.0010
11	11	1.1000	-2.0000	-.2300	-.4500	-.0020	-.0060

OUTPUT

-30401.20317	0.00000	14.03000	0.00000	-0.06200	0.00000
-2163.80029	5778.20020	8.76000	-3.71000	0.11400	-0.04300
-1540.10010	0.00000	-23.29000	0.00000	-0.15400	0.00000
2997.90039	-1932.00024	-0.09000	-14.31000	-0.01800	0.05400
1590.30005	202.90002	-4.56000	-16.62000	-0.25300	-0.01600
1307.10010	0.00000	-0.93000	0.00000	-0.12300	0.00000
-1988.90014	-425.40002	-10.62000	5.20000	-0.02700	0.09500
1276.80005	227.80001	2.31000	2.53000	0.02800	-0.00700
881.20007	-133.80001	-5.89000	-6.98000	-0.18300	0.07900
949.30005	0.00000	1.45000	0.00000	0.00100	0.00000
803.50012	160.30001	0.90000	-2.19000	-0.04400	0.00400
502.90002	-274.30004	-1.75000	-0.14000	0.01700	0.05600
-397.70001	2.30000	0.66000	1.88000	0.00700	-0.03500
266.50006	-246.60000	-3.01000	-6.52000	-0.09700	-0.04700
-233.50003	0.00000	1.61000	0.00000	0.04500	0.00000
355.70001	5.10000	0.60000	2.24000	0.00100	-0.04600
228.40002	117.80000	3.34000	1.59000	0.07500	0.00700
-28.80000	-114.80000	-0.04000	-2.61000	0.00800	-0.00700
-157.90002	-108.90000	-0.60000	0.50000	0.01500	0.00100
-62.20000	82.40000	1.76000	-0.12000	0.05600	-0.02400
49.20000	0.00000	-0.42000	0.00000	-0.00600	0.00000
57.50000	-12.10000	0.82000	0.05000	0.01500	0.02000
-0.80000	104.40000	0.82000	0.09000	0.01000	-0.01100
-238.30001	56.60000	2.35000	2.55000	0.05000	0.01500
-1.50000	-23.40000	0.83000	-1.19000	-0.01100	-0.02900
-2.00000	-14.80000	0.01000	0.33000	0.02600	0.02900
-108.90000	-13.30000	0.23000	0.84000	0.02300	-0.01000
72.20001	0.00000	-0.57000	0.00000	-0.01400	0.00000
-53.70000	-53.70000	-0.34000	-0.96000	-0.00600	-0.01400

7.90000	-27.40000	-1.44000	0.01000	-0.03400	0.01600
15.60000	-8.10000	-0.90000	0.43000	-0.00400	0.01400
-24.30000	7.00000	0.03000	0.75000	-0.00600	0.00500
-3.60000	24.30000	-0.60000	-0.33000	-0.02700	-0.00800
15.50000	-22.50000	-0.17000	0.49000	-0.00100	0.01600
3.60000	-21.40000	-0.64000	0.90000	-0.00400	0.01100
8.50000	0.00000	0.35000	0.00000	0.00600	0.00000
6.50000	5.40000	0.50000	-0.50000	0.00800	-0.01500
-9.30000	-11.70000	1.70000	-0.21000	0.03900	-0.01200
-9.60000	4.20000	-0.11000	0.03000	-0.00800	0.00500
-6.10000	-15.30000	0.34000	-0.79000	0.01500	-0.01100
5.50000	4.60000	-0.07000	0.05000	-0.00200	0.00000
-8.10000	21.90000	0.43000	0.10000	0.00500	-0.00300
13.00000	-0.70000	-0.15000	-0.36000	-0.00800	-0.00900
7.40000	-17.10000	-0.42000	-0.43000	-0.00700	-0.00300
10.40000	0.00000	-0.10000	0.00000	-0.00500	0.00000
5.80000	-22.40000	-0.13000	0.66000	-0.00100	0.02200
7.50000	13.80000	-1.20000	0.54000	-0.02700	0.00700
-15.10000	6.30000	0.08000	0.03000	0.00500	-0.00200
12.10000	-3.00000	-0.08000	0.35000	-0.00700	0.00900
4.70000	-1.90000	-0.39000	-0.03000	-0.00600	0.00600
0.20000	9.00000	-0.36000	-0.01000	-0.00900	-0.00100
1.60000	11.50000	0.47000	0.45000	0.00600	0.00900
0.90000	0.10000	0.37000	-0.05000	0.00500	-0.00400
0.20000	-1.50000	-0.46000	0.75000	-0.00900	0.01900
-2.90000	0.00000	-0.01000	0.00000	-0.00300	0.00000
-0.90000	-0.10000	-0.13000	-0.61000	-0.00300	-0.01200
-2.20000	4.50000	0.88000	-0.64000	0.02000	-0.01400
0.80000	-1.00000	-0.18000	0.02000	-0.00800	0.00100
-2.80000	2.60000	0.17000	0.05000	0.00700	0.00100
6.40000	-4.40000	-0.02000	-0.63000	0.00100	-0.01100
4.70000	-1.30000	0.05000	-0.07000	0.00100	-0.00100
-0.20000	-3.60000	0.17000	0.07000	0.00100	0.00100
1.80000	4.00000	0.16000	-0.03000	0.00500	-0.00100
2.00000	1.00000	0.31000	-0.02000	0.00400	0.00100
1.10000	-2.00000	-0.23000	-0.45000	-0.00200	-0.00600
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

```
// JOB
// DUP
*STOREDATA  WS  UA  CF2      3
// XEQ CCF1     1
*FILES(7,CF2)
```

CONTROL CARDS
AND INPUT

2	1	-30339.	0.0	15.3	0.0
2	2	-2123.	5758.	8.7	-2.3
3	1	-1654.	0.0	-24.4	0.0
3	2	2994.	-2006.	0.3	-11.8
3	3	1567.	130.	-1.6	-16.7
4	1	1297.	0.0	0.2	0.0
4	2	-2036.	-403.	-10.8	4.2
4	3	1289.	242.	0.7	0.7
4	4	843.	-176.	-3.8	-7.7
5	1	958.	0.0	-0.7	0.0
5	2	805.	149.	0.2	-0.1
5	3	492.	-280.	-3.0	1.6
5	4	-392.	8.	-0.1	2.9
5	5	256.	-265.	-2.1	-4.2
6	1	-223.	0.0	1.9	0.0
6	2	357.	16.	1.1	2.3
6	3	246.	125.	2.9	1.7
6	4	-26.	-123.	0.6	-2.4
6	5	-161.	-107.	0.0	0.8
6	6	-51.	77.	1.3	-0.3
7	1	47.	0.0	-0.1	0.0
7	2	60.	-14.	-0.3	-0.9
7	3	4.	106.	1.1	-0.4
7	4	-229.	68.	1.9	2.0
7	5	3.	-32.	-0.4	-1.1
7	6	-4.	-10.	-0.4	0.1
7	7	-112.	-13.	-0.2	0.9
8	1	71.	0.0	-0.5	0.0
8	2	-54.	-57.	-0.3	-1.1
8	3	-0.	-27.	-0.7	0.3
8	4	12.	-8.	-0.5	0.4
8	5	-25.	9.	0.3	0.2
8	6	-9.	23.	-0.0	0.4
8	7	13.	-19.	-0.2	0.2
8	8	-2.	-17.	-0.6	0.3
9	1	10.	0.0	0.1	0.0
9	2	9.	3.	0.4	0.1
9	3	-3.	-13.	0.6	-0.2
9	4	-12.	5.	0.0	-0.3
9	5	-4.	-17.	-0.0	-0.2
9	6	7.	4.	-0.1	-0.3
9	7	-5.	22.	0.3	-0.4
9	8	12.	-3.	-0.3	-0.3
9	9	6.	-16.	-0.5	-0.3
0	0				

OUTPUT

-30339.00395	0.00000	15.30000	0.00000	0.00000	0.00000
-2123.00049	5758.00098	8.70000	-2.30000	0.00000	0.00000
-1654.00024	0.00000	-24.40000	0.00000	0.00000	0.00000
2994.00049	-2006.00024	0.30000	-11.80000	0.00000	0.00000
1567.00024	130.00003	-1.60000	-16.70000	0.00000	0.00000
1297.00024	0.00000	0.20000	0.00000	0.00000	0.00000
-2036.00024	-403.00006	-10.80000	4.20000	0.00000	0.00000
1289.00024	242.00003	0.70000	0.70000	0.00000	0.00000
843.00012	-176.00003	-3.80000	-7.70000	0.00000	0.00000
958.00012	0.00000	-0.70000	0.00000	0.00000	0.00000
805.00012	149.00003	0.20000	-0.10000	0.00000	0.00000
492.00006	-280.00006	-3.00000	1.60000	0.00000	0.00000
-392.00006	8.00000	-0.10000	2.90000	0.00000	0.00000
256.00006	-265.00006	-2.10000	-4.20000	0.00000	0.00000
-223.00003	0.00000	1.90000	0.00000	0.00000	0.00000
357.00006	16.00000	1.10000	2.30000	0.00000	0.00000
246.00003	125.00001	2.90000	1.70000	0.00000	0.00000
-26.00000	-123.00001	0.60000	-2.40000	0.00000	0.00000
-161.00003	-107.00001	0.00000	0.80000	0.00000	0.00000
-51.00000	77.00001	1.30000	-0.30000	0.00000	0.00000
47.00000	0.00000	-0.10000	0.00000	0.00000	0.00000
60.00000	-14.00000	-0.30000	-0.90000	0.00000	0.00000
4.00000	106.00001	1.10000	-0.40000	0.00000	0.00000
-229.00003	68.00001	1.90000	2.00000	0.00000	0.00000
3.00000	-32.00000	-0.40000	-1.10000	0.00000	0.00000
-4.00000	-10.00000	-0.40000	0.10000	0.00000	0.00000
-112.00001	-13.00000	-0.20000	0.90000	0.00000	0.00000
71.00001	0.00000	-0.50000	0.00000	0.00000	0.00000
-54.00000	-57.00000	-0.30000	-1.10000	0.00000	0.00000
0.00000	-27.00000	-0.70000	0.30000	0.00000	0.00000
12.00000	-8.00000	-0.50000	0.40000	0.00000	0.00000
-25.00000	9.00000	0.30000	0.20000	0.00000	0.00000
-9.00000	23.00000	0.00000	0.40000	0.00000	0.00000
13.00000	-19.00000	-0.20000	0.20000	0.00000	0.00000
-2.00000	-17.00000	-0.60000	0.30000	0.00000	0.00000
10.00000	0.00000	0.10000	0.00000	0.00000	0.00000
9.00000	3.00000	0.40000	0.10000	0.00000	0.00000
-3.00000	-13.00000	0.60000	-0.20000	0.00000	0.00000
-12.00000	5.00000	0.00000	-0.30000	0.00000	0.00000
-4.00000	-17.00000	0.00000	-0.20000	0.00000	0.00000
7.00000	4.00000	-0.10000	-0.30000	0.00000	0.00000
-5.00000	22.00000	0.30000	-0.40000	0.00000	0.00000
12.00000	-3.00000	-0.30000	-0.30000	0.00000	0.00000
6.00000	-16.00000	-0.50000	-0.30000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*LISTALL
*ARITHMETIC TRACE
*TRANSFER TRACE
*ONE WORD INTEGERS
C MGFN2
C ADDITIONAL SUBROUTINE FNLPL
C MGFN2 PRODUCES MAGNETICS FINAL PLOT FROM DATA STORED ON DISK.
C READ XMIN AND XMAX IN MILES.
C      NSS2 NONZERO TO LIST ANSWERS
C       NSS3=1 FOR PERIOD, =0 FOR GAMMAS(ELTANIN DATA)
C IF RESID+CONST IS GREATER THAN 1200 OR LESS THAN -1700, POINT IS NOT
C PLOTTED.
C PLOT EXTENDS FROM (-1700-CONST) TO (1200-CONST) GAMMAS.
      DEFINE FILE 3(1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 15(1000,11,U,INXT)
      DEFINE FILE 16(8000,18,U,INXT)
      COMMON AM(12),AY(11),B(160)
      INT=1
      GLAT=0.0
      GLONG=0.0
      GDIS=0.0
      TI=0.0
      RESID=0.0
      JENT=1
      INDEX=1
      KS=0
      KT=0
      READ(8,100)XMIN,XMAX,CONST,NSS2,NSS3
  100 FORMAT(3F10.3,2X2I2)
    1 CALL FNLPL(INT,XMIN,XMAX,GDIS,RESID,CONST)
      INT=2
      CALL DMAG2(XMIN,XMAX,NSS3,JENT,GLAT,GLONG,GDIS,RESID,INDEX,NSS2,XX
     1E,XXN,XXD,PLAT1,PLNG1,PLAT2,PLNG2,TI,KS)
      IF(GDIS-XMAX)1,50,50
   50 CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92  GLAT(R )=001C      GLONG(R )=001E       GDIS(R )=0020
    TI(R )=0022      RESID(R )=0024       XMIN(R )=0026       XMAX(R )=0028      CONST(R )=002A        XXE(R )=002C
   XXN(R )=002E        XXD(R )=0030      PLAT1(R )=0032      PLNG1(R )=0034      PLAT2(R )=0036      PLNG2(R )=0038
  INXT(I )=003A        INT(I )=003B       JENT(I )=003C      INDEX(I )=003D         KS(I )=003E         KT(I )=003F
  NSS2(I )=0040       NSS3(I )=0041
```

```
STATEMENT ALLOCATIONS
 100  =0048  1    =009C  50   =00C4

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 FNLPL   DMAG2   FSUB    FLD     FSTO    SFAR    SIAR    TYPEZ   SFIF    WCHRI   READZ   SRED    SFIO    SIOF    SIOI
 PRNZ    SDFIC

REAL CONSTANTS
  .000000E 00=0042

INTEGER CONSTANTS
     1=0044      0=0045      8=0046      2=0047

CORE REQUIREMENTS FOR
 COMMON    366  VARIABLES     66  PROGRAM    132

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*LISTALL
*ARITHMETIC TRACE
*TRANSFER TRACE
*ONE WORD INTEGERS
      SUBROUTINE FNLPL(INT,XMIN,XMAX,GDIS,RESID,CONST)
      COMMON AM(12),AY(11),B(160)
      GO TO(1,2),INT
    1 YMIN=-1700.-CONST
      YMAX=1200.-CONST
      CALL SCALF(0.05,0.01,0.0,YMIN)
      N3=XMIN/600.
      DDIS=0.0
  203 XONE=N3*600.+190.
      XTWO=N3*600.+200.
      XXONE=N3*600.
      IF(DDIS-0.0)8001,8000,8001
 8001 CALL FPLOT(1,XXONE,YMIN)
 8000 CALL SCALF(0.05,0.01,XXONE,YMIN)
      CALL FPLOT(1,XONE,YMAX)
      DO 5163 K=1,14
      AK=K
      Y=YMAX-((AK-1.)*200.)
      CALL FPLOT(-2,XONE,Y)
      CALL FPLOT(-1,XTWO,Y)
      IIK=0
 5163 CONTINUE
      N3=N3+1
      GO TO(10,5165),INT
   10 RETURN
    2 FA=RESID
      IF(FA-YMAX)520,520,10
  520 IF(FA-YMIN)10,5165,5165
 5165 IF(GDIS-N3*600.)5166,222,222
  222 DDIS=GDIS
      GO TO 203
 5166 IF(GDIS)10,5000,5000
 5000 IF(GDIS-XMIN)10,518,518
  518 IF(GDIS-XMAX)519,519,10
  519 IF((GDIS-DDIS)-10.)5191,5190,5190
 5190 CALL FPLOT(1,GDIS,FA)
      GO TO 102
 5191 IF(IIK)103,102,103
  102 CALL FPLOT(-2,GDIS,FA)
      IIK=IIK+1
```

```
      GO TO 104
  103 CALL FPLOT(0,GDIS,FA)
  104 DDIS=GDIS
      GO TO 10
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92  YMIN(R )=0000       YMAX(R )=0002       DDIS(R )=0004
  XONE(R )=0006       XTWO(R )=0008       XXONE(R )=000A         AK(R )=000C          Y(R )=000E         FA(R )=0010
    N3(I )=0014          K(I )=0015         IIK(I )=0016

STATEMENT ALLOCATIONS
 1     =0050  203  =006E  8001 =008E  8000 =0093  5163 =00C9  10   =00DD  2    =00DF  520  =00EA  5165 =00F1  222  =00FB
 5166 =0101  5000 =0106  518  =010D  519  =0114  5190 =011D  5191 =0124  102  =0129  103  =013B  104  =0140

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 SCALF   FPLOT   FSUB    FMPY    FDIV    FLD     FSBR    SFAR    SIAR    IFIX    FLOAT   SIIF    SFIF    SGOTO   SNR
 SUBIN

REAL CONSTANTS
  .170000E 04=0018    .120000E 04=001A    .500000E-01=001C    .100000E-01=001E    .000000E 00=0020    .600000E 03=0022
  .190000E 03=0024    .200000E 03=0026    .100000E 01=0028    .100000E 02=002A

INTEGER CONSTANTS
     1=002C     14=002D      2=002E      0=002F

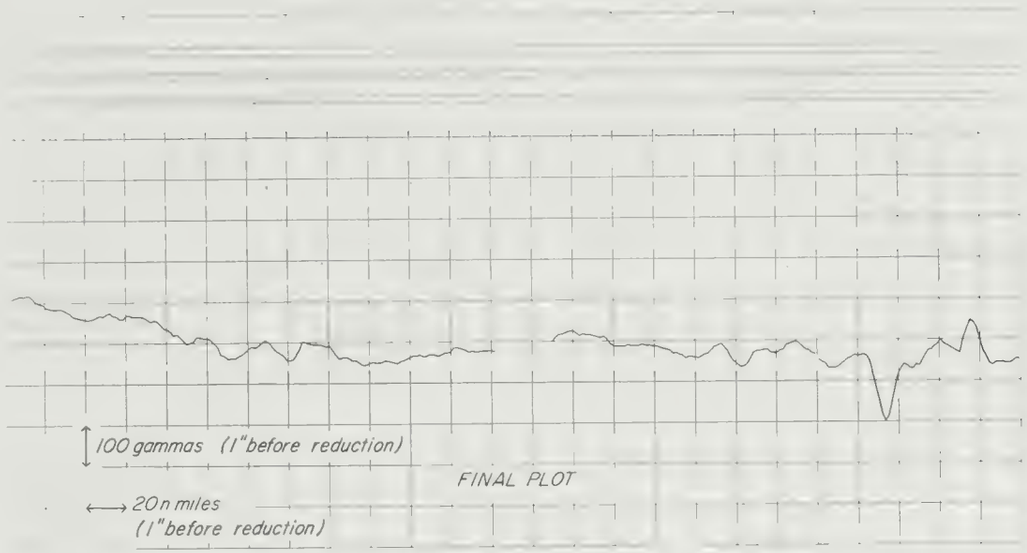
CORE REQUIREMENTS FOR FNLPL
 COMMON    366  VARIABLES     24  PROGRAM    302

 END OF COMPILATION
```

```
// JOB     2005 4005
// XEQ MGFN2     1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF1)
     3800.      4300.       400.    0 1
```

CONTROL CARDS
AND INPUT

OUTPUT



```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
*ONE WORD INTEGERS
C      MGGG2 WITH LINK MGGG3 PLOTS MAGNETIC ANOMALY ON MERCATOR ALONG THE
C      TRACK.
C      MAGNETIC INPUT FROM DISK
C      FOR WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG SEE MEGRW
C      JG NONZERO IF MEGRW IS USED
C FOR SCALX,YLOW,YHIGH,NSP1,NSP2,NSP3,THET,SEE MERGP.
C THET IS READ IN DEGREES.
C      IOTHR IS NOT USED HENCE LEAVE BLANK
C      IF IOUT IS NON ZERO PROG WILL EXIT AFTER IT GOES OUT OF GRID ONCE
C      NEWGR IS 0 IF PEN GOES BACK TO ORIGIN,NON ZERO TO GO NEXT GRID
C      KS IS NUMBER OF DAYS SKIPPED AT BEGINNING.
C PLOT IS MADE FOR POINTS BETWEEN XMIN AND XMAX N. MILES ALONG TRACK.
C NSS2 NONZERO FOR PRINTED ANSWERS.
C NSS3=0 FOR DATA IN GAMMAS,=1 FOR DATA IN PERIOD(VEMA AND CONRAD).
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      READ(8,700)WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG,JG
  700 FORMAT(5F10.1,4I5)
      CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      IF(JG)901,902,901
  901 CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
  902 CALL LINK(MGGG3)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88       IGRI(I )=0000       IMIN(I )=0001       IGG(I )=0002        JG(I )=0003

STATEMENT ALLOCATIONS
 700  =0005  901  =0043  902  =004D

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   FLD     FSTO    TYPEZ   CARDZ   WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ    SDFIO

INTEGER CONSTANTS
     8=0004

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES      4  PROGRAM     78
```

```
 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
*ONE WORD INTEGERS
C MGGG3
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3(1,10,U,INXT)
      DEFINE FILE 4(4000,3,U,INXT)
      DEFINE FILE 15(1000,11,U,INXT)
      DEFINE FILE 16(8000,18,U,INXT)
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      READ(8,704)SCALX,YLOW,YHIGH,CONST,IOUT,NSP1,NSP2,NSP3,THET
      THET=THET*.01745
      READ(8,705)XMIN,XMAX,NSS3,NSS2,KS,NEWGR
      GLAT=0.0
      GLONG=0.0
      RESID=0.0
      TI=0.0
      GDIS=0.0
      JENT=1
      XXE=0.0
      XXN=0.0
      XXD=0.0
      PLAT1=0.0
      PLNG1=0.0
      PLAT2=0.0
      PLNG2=0.0
      S=0.0
      IY=0
      IX=0
      INDEX=1
      YYM=ALATI(ANLAT,SLAT,ANLAT)
    1 CALL DMAG2(XMIN,XMAX,NSS3,JENT,GLAT,GLONG,GDIS,RESID,INDEX,NSS2,
     1XXE,XXN,XXD,PLAT1,PLNG1,PLAT2,PLNG2,TI,KS)
      IF (JENT-3) 2,6,6
    2 RESID=RESID-CONST
      CALL MERGP(GLAT,GLONG,RESID,WLONG,ELONG,SLAT,ANLAT,SCALE,YYM,PLAT1,PLNG1,P
     1,PLNG1,PLAT2,PLNG2,INDEX,XXE,XXN,SCALX,YLOW,YHIGH,IX,XXD,S,NSP1,NSP2
     2P2,NSP3,THET)
```

```
      IF(IOUT)301,1,301
  301 IF(IY)302,302,303
  302 IF(IX)1,1,305
  305 IY=1
      GO TO 1
  303 IF(IX)6,6,1
    6 WRITE(5,750)
  750 FORMAT(' EXIT ROUTINE CALLED')
      IF(NEWGR)61,60,61
   60 CALL FPLOT(1,0.,0.)
      GO TO 62
   61 X=(ELONG-WLONG)*SCALE+6.
      CALL FPLOT(1,X,0.0)
   62 CALL EXIT
  702 FORMAT(6F10.3)
  703 FORMAT(5I5)
  704 FORMAT(4F10.3,4I5,F5.1)
  705 FORMAT(2F10.3,4I5)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFF-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88      SCALX(R )=0024      YLOW(R )=0026      YHIGH(R )=0028      CONST(R )=002A
  THET(R )=002C       XMIN(R )=002E       XMAX(R )=0030      GLAT(R )=0032      GLONG(R )=0034      RESID(R )=0036
    TI(R )=0038       GDIS(R )=003A        XXE(R )=003C       XXN(R )=003E        XXD(R )=0040      PLAT1(R )=0042
 PLNG1(R )=0044      PLAT2(R )=0046      PLNG2(R )=0048         S(R )=004A        YYM(R )=004C          X(R )=004E
  INXT(I )=0050       IOUT(I )=0051       NSP1(I )=0052      NSP2(I )=0053      NSP3(I )=0054       NSS3(I )=0055
  NSS2(I )=0056         KS(I )=0057      NEWGR(I )=0058      JENT(I )=0059        IY(I )=005A         IX(I )=005B
 INDEX(I )=005C

UNREFERENCED STATEMENTS
 702     703

STATEMENT ALLOCATIONS
 750  =0069  702  =0075  703  =0078  704  =0078  705  =0081  1    =0114  2    =012F  301  =0155  302  =0159  305  =015D
 303  =0163  6    =0167  60   =016F  61   =0176  62   =0185

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 ALATI   DMAG2   MERGP   FPLOT   FSUB    FMPY    FLD     FSTO    TYPEZ   CARDZ   WCHRI   READZ   SRED    SWRT    SCOMP
 SFIO    SIOF    SIOI    PRNZ    SDFIO

REAL CONSTANTS
  .174500E-01=005E    .000000E 00=0060    .600000E 01=0062

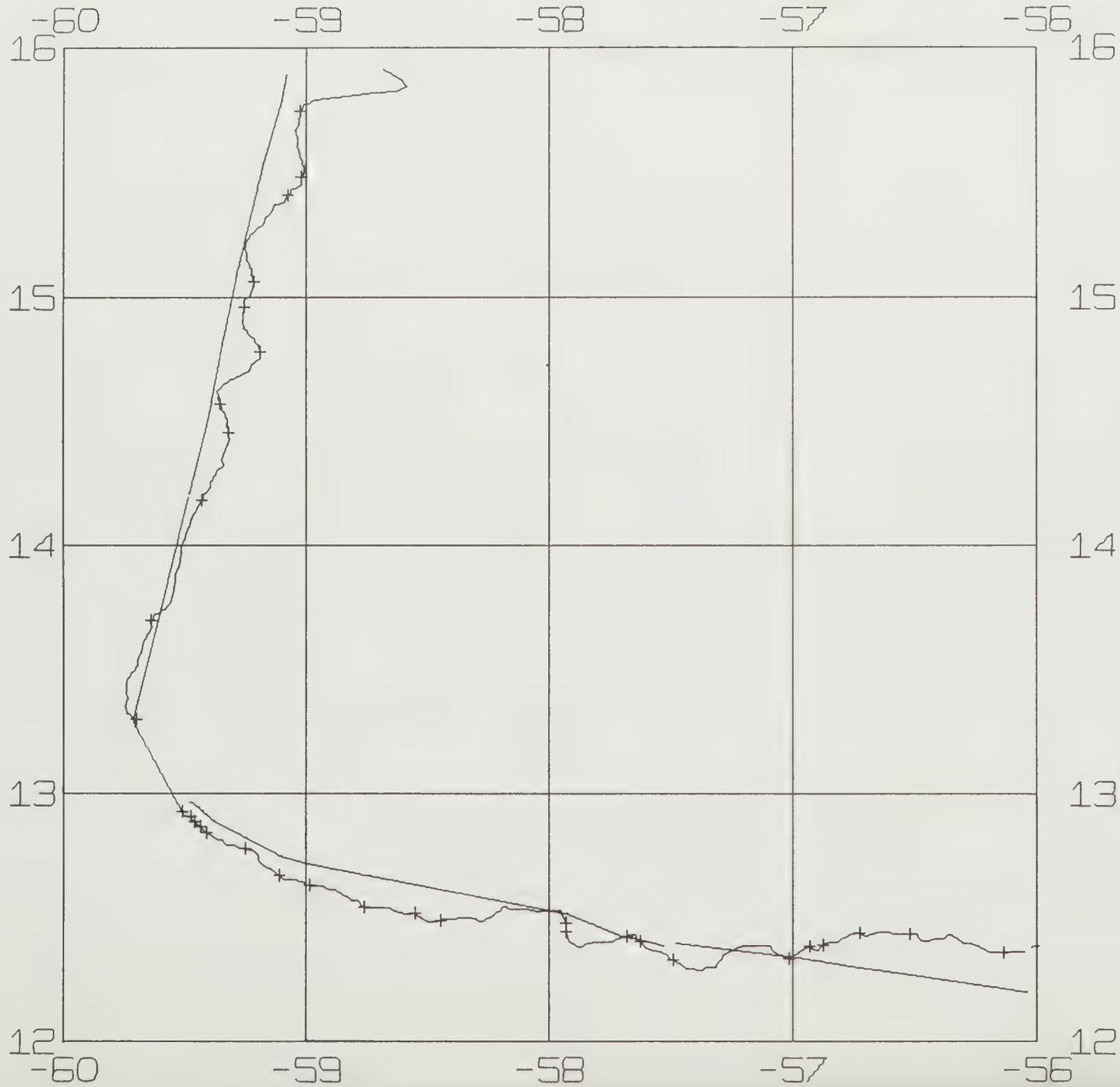
INTEGER CONSTANTS
     5=0064      1=0065      0=0066      3=0067      5=0068

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES     94  PROGRAM    296

 END OF COMPILATION
```

CONTROL CARDS
AND INPUT

```
// JOB     2005 4005
// XEQ MGGG2     1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF1)
      -60.      -56.       12.       16.        2.    2    0    1    1
      200.        1.        1.        0.    0    0    0    0   0.
     3700.     5000.    1    0    0    0
```



OUTPUT

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
*ONE WORD INTEGERS
C      MGGG8 WITH LINK MGGG9 ANNOTATES MAG ON MERC,MAG INPUT FROM DISK
C      FOR WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG SEE MEGRW
C      SIZE IS SIZE OF MAG ANNOTATIONS
C      IF IOUT IS NON ZERO PROG WILL EXIT AFTER IT GOES OUT OF GRID ONCE
C NEWGR IS 0 IF PEN GOES BACK TO ORIGIN, NON ZERO TO GO TO NEXT GRID
C AFTER THIS PLOT.
C      SSS IS NON ZERO TO ANNOTATE TOTAL FIELD IN TENS OF GAMMAS,=0 TO
C      ANNOTATE RESIDUAL FIELD IN GAMMAS.
C      PROGRAM WILL IGNORE VALUES LESS THAN XMIN MILES OR MORE THAN XMAX
C      MILES ALONG TRACK.
C      PROGRAM ALSO SKIPS FIRST KS DAYS
C NSS2 NON ZERO FOR PRINTED ANSWERS
C NSS3=0 FOR DATA IN GAMMAS
C NSS3=1 FOR DATA IN PERIOD
C IGNORE SCALX,YLOW,YHIGH
C CONST IS SUBTRACTED FROM RESIDUAL FIELD.
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
      READ(8,700)WLONG,ELONG,SLAT,ANLAT,SCALE,IGRI,IMIN,IGG,JG
  700 FORMAT(5F10.1,4I5)
      CALL MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      IF(JG)901,902,901
  901 CALL MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
  902 CALL LINK(MGGG9)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88       IGRI(I )=0000       IMIN(I )=0001       IGG(I )=0002        JG(I )=0003

STATEMENT ALLOCATIONS
 700  =0005  901  =0043  902  =004D

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 MEGRI   MEGRW   FLD     FSTO    TYPEZ   CARDZ   WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ    SDFIO

INTEGER CONSTANTS
     8=0004

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES      4  PROGRAM     78
```

```
 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
*ONE WORD INTEGERS
C MGGG9
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 3(1,10,U,INXT)
      DEFINE FILE 4(4000,3,U,INXT)
      DEFINE FILE 15(1000,11,U,INXT)
      DEFINE FILE 16(8000,18,U,INXT)
      COMMON AM(12),AY(11),B(160),SCALE,WLONG,ELONG,SLAT,ANLAT
C      SSS=0 TO ANNOTATE RESIDUAL.SSS=NONZERO FOR TOTAL FIELD OBSDRVED.
      READ(8,704)SCALX,YLOW,YHIGH,CONST,IOUT
      READ(8,705)XMIN,XMAX,NSS3,NSS2,SIZE,SSS
      READ(8,706)KS
      XFRE=0.
      YFRE=0.
      IND3=1
      GLAT=0.0
      GLONG=0.0
      RESID=0.0
      GDIS=0.0
      JENT=1
      TI=0.0
      XXE=0.0
      XXN=0.0
      XXD=0.0
      PLAT1=0.0
      PLNG1=0.0
      PLAT2=0.0
      PLNG2=0.0
      S=0.0
      IY=0
      IX=0
      INDEX=1
      YYM=ALATI(ANLAT,SLAT,ANLAT)
    1 CONTINUE
      CALL DMAG2(XMIN,XMAX,NSS3,JENT,GLAT,GLONG,GDIS,RESID,INDEX,NSS2,XX
     1E,XXN,XXD,PLAT1,PLNG1,PLAT2,PLNG2,TI,KS)
```

```
      IF(JENT-3)2,6,6
    2 IF(SSS)600,650,600
  650 RESID=RESID-CONST
      GO TO 675
  600 RESID=TI/10.
  675 CALL MERGR(GLAT,GLONG,RESID,WLONG,ELONG,SLAT,ANLAT,SCALE,SIZE,XFRE
     1  ,YFRE,IND3,IY)
      IF(IOUT)301,92,301
  301 IF(IY)302,302,303
  302 IF(IX)92,92,305
  305 IY=1
      GO TO 92
  303 IF(IX)6,6,92
   92 GO TO 1
    6 CALL FPLOT( 1,0.0,0.0)
      CALL EXIT
  702 FORMAT(6F10.3)
  703 FORMAT(5I5)
  704 FORMAT(4F10.3,I5)
  705 FORMAT(2F10.3,2I5,2F10.5)
  706 FORMAT(I5)
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92 SCALE(RC)=7E90      WLONG(RC)=7E8E      ELONG(RC)=7E8C
  SLAT(RC)=7E8A      ANLAT(RC)=7E88      SCALX(R )=0024       YLOW(R )=0026      YHIGH(R )=0028      CONST(R )=002A
  XMIN(R )=002C       XMAX(R )=002E       SIZE(R )=0030        SSS(R )=0032       XFRE(R )=0034       YFRE(R )=0036
  GLAT(R )=0038      GLONG(R )=003A      RESID(R )=003C       GDIS(R )=003E         TI(R )=0040        XXE(R )=0042
   XXN(R )=0044        XXD(R )=0046      PLAT1(R )=0048      PLNG1(R )=004A      PLAT2(R )=004C      PLNG2(R )=004E
     S(R )=0050        YYM(R )=0052       INXT(I )=0054       IOUT(I )=0055       NSS3(I )=0056       NSS2(I )=0057
    KS(I )=0058       IND3(I )=0059       JENT(I )=005A         IY(I )=005B         IX(I )=005C      INDEX(I )=005D

UNREFERENCED STATEMENTS
 702     703

STATEMENT ALLOCATIONS
 702  =0066  703  =0069  704  =006C  705  =0070  706  =0077  1    =010A  2    =0125  650  =012A  600  =0132  675  =0138
 301  =014B  302  =014F  305  =0153  303  =0159  92   =015D  6    =015F

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 ALATI   DMAG2   MERGR   FPLOT   FSUB    FDIV    FLD     FSTO    TYPEZ   CARDZ   WCHRI   READZ   SRED    SFIO    SIOF
 SIOI    PRNZ    SDFIO

REAL CONSTANTS
  .000000E 00=005E    .100000E 02=0060

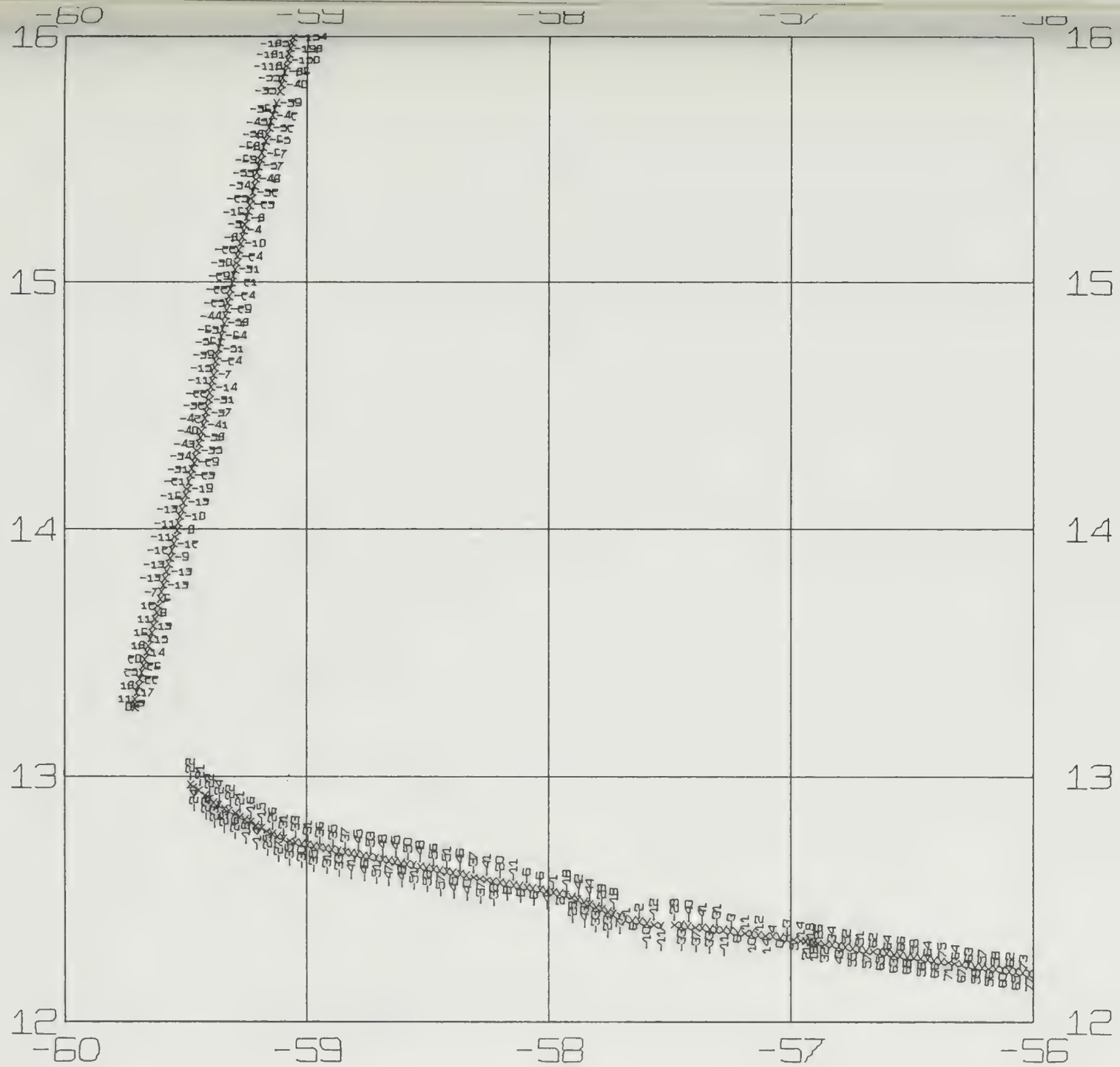
INTEGER CONSTANTS
     8=0062      1=0063      0=0064      3=0065

CORE REQUIREMENTS FOR
 COMMON    376  VARIABLES     94  PROGRAM    264
```

```
END OF COMPILATION
```

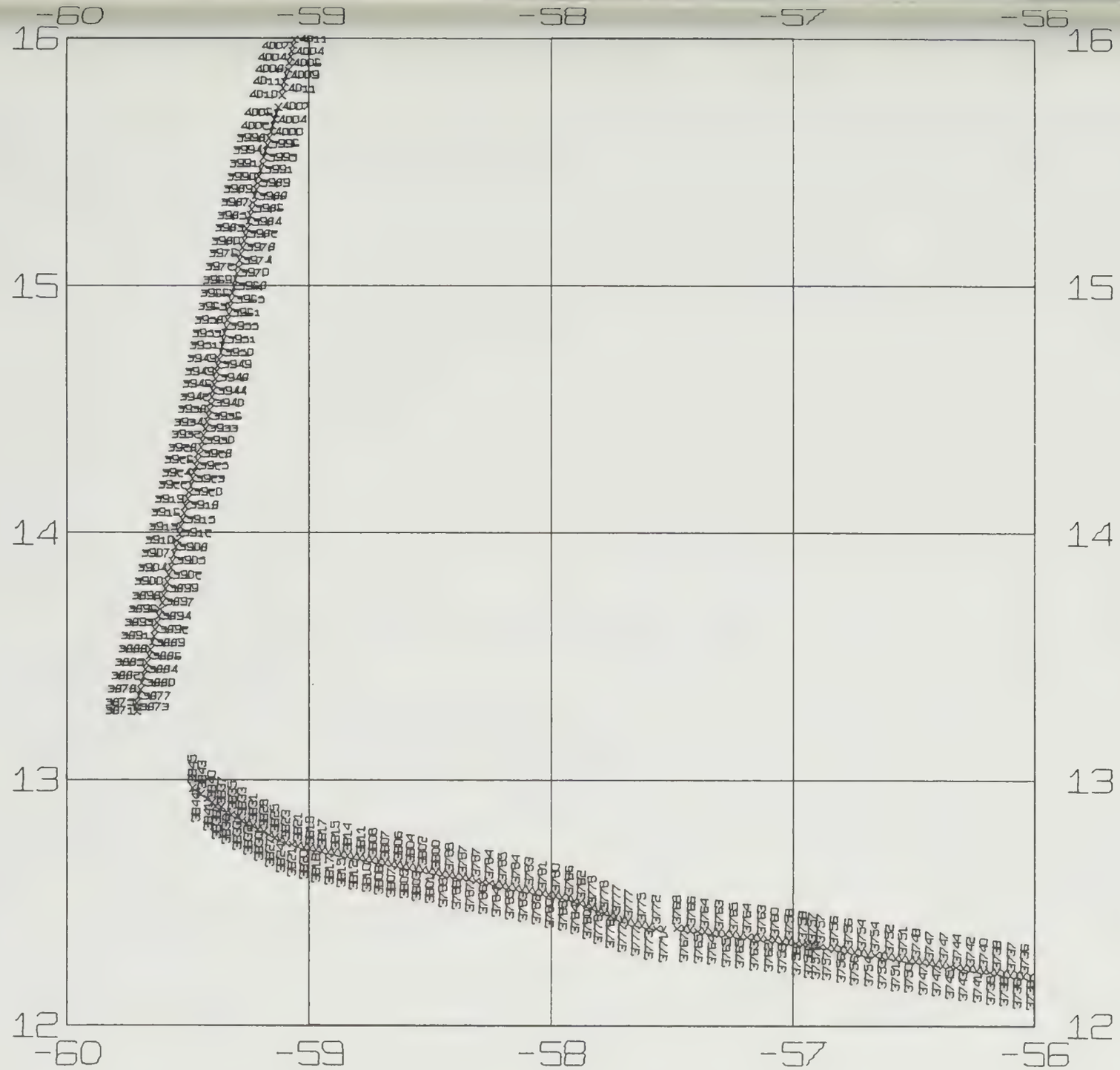
CONTROL CARDS
AND INPUT

```
// JOB    2005 4005
// XEQ MGGG8    1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF1)
      -60.      -56.       12.       16.        2.    2    0    1    1
      500.        1.        1.        0.    0
     3700.     5000.    1    0       .06        0.
    0
```


-60
-59
-58
-57
-56
16
15
14
13
12

```
// JOB     2005 4005
// XEQ MGGG8     1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF1)
      -60.       -56.        12.        16.         2.    2    0    1    1
      500.         1.         1.         0.    0
     3700.      5000.    1    0        .06         1.
    0
```

CONTROL CARDS
AND INPUT


-60
-59
-58
-57
-56
16
15
14
13
12

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*ONE WORD INTEGERS
C     MGNAV
C ADDS REGIONAL MAGNETICS AT EACH NAVIGATION POINT
C INPUT IS NAVIGATION DATA AND FILE CF1 ON DISK.
C OUTPUT IS NAVIGATION DATA FILE ON DISK WITH ADDED REGIONAL MAGNETICS
C DATA.
C     FOR NAVIGATION DATA PRE 1960.0 SET VARIABLE AGE NON ZERO.  AGE WILL
C     THEN COMPUTE THEORETICAL FIELD ASSUMING ALL DATA RECORDED 1960.0
C FOR POST 1960 DATA PROPER AGE IS TAKEN FROM NAVIGATION FILE.
C     PROGRAM REQUIRES 3-5 SECONDS PER NAVIAGION POINT.
      DEFINE FILE 7(66,12,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DIMENSION P(11,11),DP(11,11),CONST(66),SP(11),CP(11),TG(66),TH(66)
     1,G(66),H(66),GT(66),HT(66),GTT(66),HTT(66)
      READ(8,9999)AGE
 9999 FORMAT(F10.3)
      DO 5011 KKK=1,66
      TG(KKK)=0.
 5011 TH(KKK)=0.
  800 DO 8N=1,10
      NN=N+1
      DO 8M=1,NN
      P(N,M)=1.0
    8 DP(N,M)=1.0
      DP(1,1)=0.0
      SP(1)=0.0
      CP(1)=1.0
      A=6378.165
      FLAT=1.-1./298.25
      TN=100.0
      A2=A**2
      A4=A**4
      B2=(A*FLAT)**2
      A2B2=A2*(1.-FLAT**2)
      A4B4=A4*(1.-FLAT**4)
      FAC=B2/A2
      CONST(2)=0.0
      CONST(3)=0.0
      II=4
      III=6
      FLN=3.
```

```
   76 FLM=1
      DO 4 K=II,III
      CONST(K)=((FLN-2.)**2-(FLM-1.)**2)/((FLN*2.-3.)*(FLN*2.-5.))
      FLM=FLM+1.
    4 CONTINUE
      IF(III-65)89,698,698
   89 IC=III-II+1
      II=III+1
      III=II+IC
      FLN=FLN+1.
      GO TO 76
  698 DO 99 KK=2,66
      READ(7'KK)G(KK),H(KK),GT(KK),HT(KK),GTT(KK),HTT(KK)
   99 CONTINUE
      READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      DO 95 IK=1,I
      READ(1'IK)TNAV,PLAT,PLNG,SETE,TZ
      RLAT=PLAT/57.29578
      RLONG=PLNG/57.29578
      IF(AGE)5456,5450,5456
 5450 IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      TM=TNAV/8760.+JBSYR+1.-1960.
  688 IF((FABS(TM-TN))-0.02)999,999,689
 5456 TM=0.0
  689 DO 109 KK=2,66
      TG(KK)=G(KK)+TM*(GT(KK)+GTT(KK)*TM)
  109 TH(KK)=H(KK)+TM*(HT(KK)+HTT(KK)*TM)
      TN=TM
  999 SINLA=FSIN(RLAT)
      CP(2)=FCOS(RLONG)
      SP(2)=FSIN(RLONG)
      DO 10 M=3,11
      SP(M)=SP(2)*CP(M-1)+CP(2)*SP(M-1)
   10 CP(M)=CP(2)*CP(M-1)-SP(2)*SP(M-1)
      SINL2=SINLA**2
      DEN2=A2-A2B2*SINL2
      DEN=FSQRT(DEN2)
      R=FSQRT((A4-A4B4*SINL2)/DEN2)
      THETA=FATAN(FAC*SINLA/(1.E-30+FSQRT(1.-SINL2)))
      CT=FSIN(THETA)
      ST=FSQRT(1.0-CT**2)
      AOR=6371.2/R
      AR=AOR**2
      BN=0.
      BE=0.
      BV=0.
      TEMP=0.
      KK=2
```

```
      DO 54 N=2,11
      FN=N
      AR=AOR*AR
      DO 54 M=1,N
      IF (N-M) 12,11,12
   11 P(N,N)=ST*P(N-1,N-1)
      DP(N,N)=ST*DP(N-1,N-1)+CT*P(N-1,N-1)
      GO TO 13
   12 IF(N-2)2011,2012,2011
 2012 GP=1.
      GDP=1.
      GO TO 2010
 2011 GDP=DP(N-2,M)
      GP=P(N-2,M)
 2010 P(N,M)=CT*P(N-1,M)-CONST(KK)*GP
      DP(N,M)=CT*DP(N-1,M)-ST*P(N-1,M)-CONST(KK)*GDP
   13 PNM=P(N,M)*AR
   48 TEMP=TG(KK)*CP(M)+TH(KK)*SP(M)
      BN=BN-TEMP*DP(N,M)*AR
      BM=M-1
      BE=BE-(TG(KK)*SP(M)-TH(KK)*CP(M))*BM*PNM/ST
      BV=BV+TEMP*FN*PNM
      KK=KK+1
   54 CONTINUE
      RES=FSQRT(BN*BN+BE*BE+BV*BV)
      WRITE(5,701)PLAT,PLNG,RES
  701 FORMAT(1H ,F10.1,F10.1,F10.1)
      RES=RES-50000.
      IRES=RES
      WRITE(1'IK)TNAV,PLAT,PLNG,SETE,TZ,IRES
   95 CONTINUE
   96 CALL EXIT
      END
VARIABLE ALLOCATIONS
     P(R )=0106-0016    DP(R )=01F8-0108 CONST(R )=027C-01FA    SP(R )=0292-027E    CP(R )=02A8-0294    TG(R )=032C-02AA
    TH(R )=03B0-032E     G(R )=0434-03B2     H(R )=04B8-0436    GT(R )=053C-04BA    HT(R )=05C0-053E   GTT(R )=0644-05C2
   HTT(R )=06C8-0646   AGE(R )=06CA          A(R )=06CC       FLAT(R )=06CE         TN(R )=06D0          A2(R )=06D2
    A4(R )=06D4         B2(R )=06D6       A2B2(R )=06D8       A4B4(R )=06DA        FAC(R )=06DC         FLN(R )=06DE
   FLM(R )=06E0       DISA(R )=06E2       DMAX(R )=06E4      CRUIS(R )=06E6       TNAV(R )=06E8        PLAT(R )=06EA
  PLNG(R )=06EC       SETE(R )=06EE         TZ(R )=06F0       RLAT(R )=06F2      RLONG(R )=06F4          TM(R )=06F6
 SINLA(R )=06F8      SINL2(R )=06FA       DEN2(R )=06FC        DEN(R )=06FE          R(R )=0700      THETA(R )=0702
    CT(R )=0704         ST(R )=0706        AOR(R )=0708         AR(R )=070A         BN(R )=070C         BE(R )=070E
    BV(R )=0710       TEMP(R )=0712         FN(R )=0714         GP(R )=0716        GDP(R )=0718        PNM(R )=071A
    BM(R )=071C        RES(R )=071E       INXT(I )=0728        KKK(I )=0729          N(I )=072A         NN(I )=072B
     M(I )=072C         II(I )=072D        III(I )=072E          K(I )=072F         IC(I )=0730         KK(I )=0731
     I(I )=0732      JBSYR(I )=0733         IK(I )=0734       IRES(I )=0735

UNREFERENCED STATEMENTS
 800     688     48      96

STATEMENT ALLOCATIONS
 9999 =0766  701  =0768  5011 =0799  800  =07A8  8    =07C1  76   =0841  4    =087B  89   =088A  698  =08A6  99   =08BE
```

```
 5450 =08F6  7002 =08FC  7001 =0902  7003 =0906  688  =0917  5456 =0927  689  =092B  109  =0940  999  =0953  10   =0994
 11   =0A3C  12   =0A66  2012 =0A6C  2011 =0A76  2010 =0A87  13   =0AC6  48   =0AD3  54   =0B34  95   =0B86  96   =0B8F

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 FABS    FSIN    FCOS    FSQRT   FATAN   FADDX   FSUB    FMPY    FMPYX   FDIV    FLD     FLDX    FSTO    FSTOX   FSBR
 FDVR    FAXI    IFIX    FLOAT   TYPEZ   WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOF    SUBSC   PRNZ    SDFIO
 SDRED   SDWRT   SDCOM   SDFX    SDF     SDI

REAL CONSTANTS
  .000000E 00=073A    .100000E 01=073C    .637816E 04=073E    .298250E 03=0740    .100000E 03=0742    .300000E 01=0744
  .200000E 01=0746    .500000E 01=0748    .572957E 02=074A    .876000E 04=074C    .196000E 04=074E    .200000E-01=0750
  .100000E-29=0752    .637120E 04=0754    .500000E 05=0756

INTEGER CONSTANTS
     8=0758      1=0759     66=075A     10=075B      2=075C      4=075D      6=075E     65=075F      7=0760      3=0761
  1959=0762   1970=0763     11=0764      5=0765

CORE REQUIREMENTS FOR
 COMMON      0  VARIABLES   1850  PROGRAM   1110

 END OF COMPILATION
```

CONTROL CARDS AND INPUT

```
// JOB
// XEQ MGNAV    1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF1)
        0.
```

Only the first and last pages of MGNAV output are given here.

OUTPUT

```
     -23.0      -43.1   24077.0
     -23.0      -43.1   24076.9
     -23.1      -42.9   24081.5
     -23.1      -42.8   24084.5
     -23.1      -42.8   24085.2
     -23.1      -42.6   24095.6
     -23.1      -42.5   24097.9
     -23.1      -42.5   24100.5
     -23.1      -42.0   24123.1
     -23.1      -41.8   24135.2
     -23.1      -41.6   24147.5
     -23.2      -41.2   24164.8
```

-23.2	-40.8	24187.6
-23.2	-40.7	24192.8
-23.2	-40.7	24195.7
-23.2	-40.3	24216.5
-23.2	-40.2	24223.9
-23.3	-39.8	24250.7
-23.3	-39.8	24251.7
-23.3	-39.3	24279.1
-23.3	-39.3	24283.3
-23.4	-39.0	24299.0
-23.3	-38.9	24313.3
-23.3	-38.6	24330.4
-23.3	-38.6	24332.6
-23.2	-38.3	24357.6
-23.1	-38.0	24385.6
-23.1	-38.0	24385.9
-23.0	-37.8	24404.8
-23.0	-37.6	24418.5
-22.9	-37.3	24440.7
-22.9	-37.2	24449.4
-22.9	-37.1	24459.6
-22.9	-37.0	24469.8
-22.9	-36.9	24477.2
-22.9	-36.7	24493.5
-22.9	-36.7	24495.6
-22.9	-36.7	24494.1
-23.0	-36.7	24493.7
-23.0	-36.7	24493.6
-23.0	-36.7	24495.7
-22.8	-36.1	24542.9
-22.8	-36.1	24543.0
-22.8	-36.1	24546.5
-22.7	-35.6	24596.8
-22.7	-35.5	24602.1
-22.7	-35.4	24612.8
-22.6	-35.3	24623.3
-22.6	-35.1	24636.5
-22.5	-34.9	24664.1
-22.5	-34.7	24682.1
-22.4	-34.5	24705.0
-22.4	-34.5	24706.4
-22.3	-34.1	24745.4
-22.3	-34.0	24754.6
-22.2	-33.8	24768.6
-22.3	-33.8	24766.1
-22.5	-33.8	24759.9
-22.5	-33.8	24762.7
-22.5	-33.8	24766.7
-22.4	-33.7	24775.6
-22.5	-33.7	24773.4
-22.5	-33.7	24775.7
-22.2	-33.5	24804.1
-22.2	-33.4	24809.5

24.8	-73.8	48618.3
24.8	-73.8	48629.0
24.8	-73.8	48629.5
25.0	-74.4	48800.0
25.1	-74.6	48877.5
25.1	-74.6	48878.4
25.2	-75.1	49011.7
25.2	-75.1	49026.1
25.3	-75.5	49122.9
25.4	-75.6	49153.5
25.4	-75.8	49207.8
25.5	-76.0	49266.2
25.5	-76.1	49280.4
25.6	-76.5	49351.2
25.6	-76.5	49354.5
25.6	-76.9	49415.2
25.6	-77.1	49441.1
25.7	-77.2	49480.8
25.8	-77.7	49592.7
25.8	-77.8	49617.1
25.9	-78.2	49681.4
25.9	-78.3	49692.4
26.0	-78.6	49747.8
26.0	-78.8	49788.0
26.0	-78.9	49799.2
26.1	-79.1	49837.9
26.0	-79.4	49817.3
26.1	-79.5	49831.8
26.1	-80.0	49904.2
26.0	-80.0	49839.3
26.0	-80.0	49796.6
26.0	-80.0	49798.4
25.9	-80.0	49766.6
25.9	-80.0	49760.4
25.8	-80.0	49711.8

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*ARITHMETIC TRACE
*TRANSFER TRACE
*LISTALL
*ONE WORD INTEGERS
C MGPR2
C MGPR2 TO PROJECT RESIDUAL MAGNETICS STARTING FROM MAGNETICS DATA ON
C DISK.
C FOR SSPR,SSPU,SSPL NON ZERO RESPECTIVELY, THE PROJECTED OUTPUT IS
C PRINTED,PUNCHED OR PLOTTED.
C ANGLE IS ANGLE WHICH POSITIVE DIRECTION OF PROJECTED PROFILE MAKES
C WITH NORTH TAKEN CLOCKWISE FROM NORTH (0 TO 360)
C XMIN IS STARTING DISTANCE IN MILES OF ORIGINAL NAVIGATION AT WHICH
C PROJECTION STARTS.
C XMAX IS FINAL DISTANCE AT WHICH PROJECTION STOPS
C VLAT AND VLON ARE LAT AND LONG OF ORIGIN OF PROJECTED PROFILE
C IS2=0 IF AVERAGE SHIP COURSE MAKES ACUTE ANGLE WITH PROJECTED
C DIRECTION, OTHERWISE IT IS =1.
C NSS3 NON ZERO FOR INPUT DATA IN FREQUENCY, ZERO FOR DATA IN GAMMAS.
C SS4 NON ZERO IF INPUT DATA ARE MAGNETIC OUTPUT CARDS.
C XKM,ZINCH,XSCAL,ZSCAL,FAC ARE ONLY READ IF SSPL IS NON ZERO
C PRINTED AND PUNCHED OUTPUT CONSIST OF PROJECTED DISTANCE IN KM
C AND RESIDUAL MAGNETIC INTENSITY
C THE ORIGIN OF THE PLOT IS MOVED FROM THE PEN POSITION BY ZINCH INCHES
C TOWARDS THE POSITIVE Y DIRECTION AND XKM KMS (SCALED TO INCHES) IN THE
C POSITIVE X DIRECTION.
C XSCAL AND ZSCAL GIVE X AND Y SCALES (KMS PER INCH, GAMMAS PER INCH)
C Y SCALE IS FURTHER REDUCED BY THE FACTOR FAC.
C IF FAC=0, PROGRAM SETS =1.
C PRINTED AND PUNCHED ANSWERS AT FORMAT(1H 6(F7.1,I6))
C IF NO. OF OUTPUT POINTS IS EVEN MULTIPLE OF SIX, LAST PRINTED LINE OR
C PUNCHED CARD IS REPEATED.
C USE PROGRAM PTROJ TO PLOT PUNCHED OUTPUT OF MGPR2 IF SEPARATE PLOTTING
C IS DESIRED. PTROJ IS NOT GIVEN AS A PART OF THIS SYSTEM.
C CONSIDERING THE ORIGIN TO BE AT XKM AND ZINCH, TICK MARKS EXTEND 3
C INCHES BELOW ORIGIN TO 5 INCHES ABOVE ORIGIN AND TO 0.1 INCHES IN THE
C +X DIRECTION
C PROGRAM WILL START FROM DAY NUMBER KS+1
C NEW DATA CAN BE LOADED IF SAME LEG
C AFTER PLOT PEN GOES TO XNEXT INCHES BEYOND PLOT ORIGIN (NOT PEN
C ORIGIN)
C HOWEVER IF XNEXT=0, PROGRAM AUTOMATICALLY SETS IT =-XKM/SCALE SO THAT
C PEN RETURNS TO PEN ORIGIN
C PROGRAM DOES NOT EXIT BUT GOES BACK TO START TO LOAD NEW DATA.
      DEFINE FILE 15(1000,11,U,INXT)
```

```
      DEFINE FILE 16(8000,18,U,INXT)
      DEFINE FILE 3(1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 4(8000,3,U,INXT)
      COMMON AM(12),AY(11),B(160)
  797 CALL SCALF(1.,1.,0.,0.)
      GLAT=0.0
      GLONG=0.0
      GDIS=0.0
      RESID=0.0
      INDEX=1
      NSS2=0
      IND1=0
      JENT=1
      XXE=0.0
      XXN=0.0
      XXD=0.0
      PLAT1=0.0
      PLNG1=0.0
      PLAT2=0.0
      PLNG2=0.0
      TI=0.0
      READ(8,702)ANGLE,XMIN,XMAX,VLAT,VLON,NSS3,IS2,SSPR,SSPU,SSPL,SS4,K
     1S
  702 FORMAT(5F10.3,2I5,4F3.0,I3)
      IF(SSPL)200,201,200
  201 XKM=0.0
      ZINCH=0.0
      XSCAL=0.0
      ZSCAL=0.0
      FAC=0.0
      GO TO 1
  200 READ(8,725)XKM,ZINCH,XSCAL,ZSCAL,FAC,XNEXT
  725 FORMAT(6F10.1)
    1 IF(SS4)2,3,2
    3 CALL DMAG2(XMIN,XMAX,NSS3,JENT,GLAT,GLONG,GDIS,RESID,INDEX,NSS2,XX
     1E,XXN,XXD,PLAT1,PLNG1,PLAT2,PLNG2,TI,KS)
      RESID=RESID/10.0
      GO TO 4
    2 READ(8,708)GLAT,GLONG,GDIS,RESID
  708 FORMAT(17XF7.3,F8.3,F8.1,16XF7.0)
    4 CALL TROJ2(GLAT,GLONG,GDIS,RESID,IND1,ANGLE,XMIN,XMAX,VLAT,VLON,IS
     12,XKM,ZINCH,XSCAL,ZSCAL,FAC,SSPR,SSPU,SSPL)
      IF(IND1-2)1,10,1
   10 WRITE(1,712)
  712 FORMAT(' LOAD NEW DATA '/' ADJUST PEN ')
      IF(SSPL)207,21,207
  207 A1=XKM/XSCAL
      A2=A1+0.1
      DO 2011 JQJ=1,9
      XJQJ=JQJ
```

```
      HT=ZINCH-4.+XJQJ
      CALL FPLOT(1,A1,HT)
      CALL FPLOT(-2,A1 ,HT)
      CALL FPLOT(-2,A2 ,HT)
 2011 CALL FPLOT( 1,A2 ,HT)
      CALL FPLOT(1,0.0,0.0)
   21 PAUSE
      IF(SSPL) 301,302,301
  301 XNEXT=XNEXT+XKM/XSCAL
      CALL FPLOT(1,XNEXT,0.0)
  302 PAUSE
      GO TO 797
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92  GLAT(R )=0024      GLONG(R )=0026       GDIS(R )=0028
 RESID(R )=002A        XXE(R )=002C        XXN(R )=002E        XXD(R )=0030      PLAT1(R )=0032      PLNG1(R )=0034
 PLAT2(R )=0036      PLNG2(R )=0038         TI(R )=003A      ANGLE(R )=003C       XMIN(R )=003E       XMAX(R )=0040
  VLAT(R )=0042       VLON(R )=0044       SSPR(R )=0046       SSPU(R )=0048       SSPL(R )=004A        SS4(R )=004C
   XKM(R )=004E      ZINCH(R )=0050      XSCAL(R )=0052      ZSCAL(R )=0054        FAC(R )=0056      XNEXT(R )=0058
    A1(R )=005A         A2(R )=005C       XJQJ(R )=005E         HT(R )=0060       INXT(I )=0064      INDEX(I )=0065
  NSS2(I )=0066       IND1(I )=0067       JENT(I )=0068       NSS3(I )=0069        IS2(I )=006A         KS(I )=006B
   JQJ(I )=006C

STATEMENT ALLOCATIONS
 702  =007F  725  =0087  708  =008A  712  =0091  797  =00BC  201  =0122  200  =0138  1    =0147  3    =014C  2    =0169
 4    =0174  10   =0190  207  =0199  2011 =01CF  21   =01E2  301  =01E9  302  =01F6

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 SCALF   DMAG2   TROJ2   FPLOT   FSUB    FDIV    FLD     FSTO    SFAR    SIAR    FLOAT   TYPEZ   SIIF    SFIF    CARDZ
 WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOF    SIOI    PRNZ    PAUSE   SDFIO

REAL CONSTANTS
  .100000E 01=006E    .000000E 00=0070    .100000E 02=0072    .100000E 00=0074    .400000E 01=0076

INTEGER CONSTANTS
     1=0078      0=0079      8=007A      2=007B      9=007C      0=007D      0=007E

CORE REQUIREMENTS FOR
 COMMON    366  VARIABLES    110  PROGRAM..  396

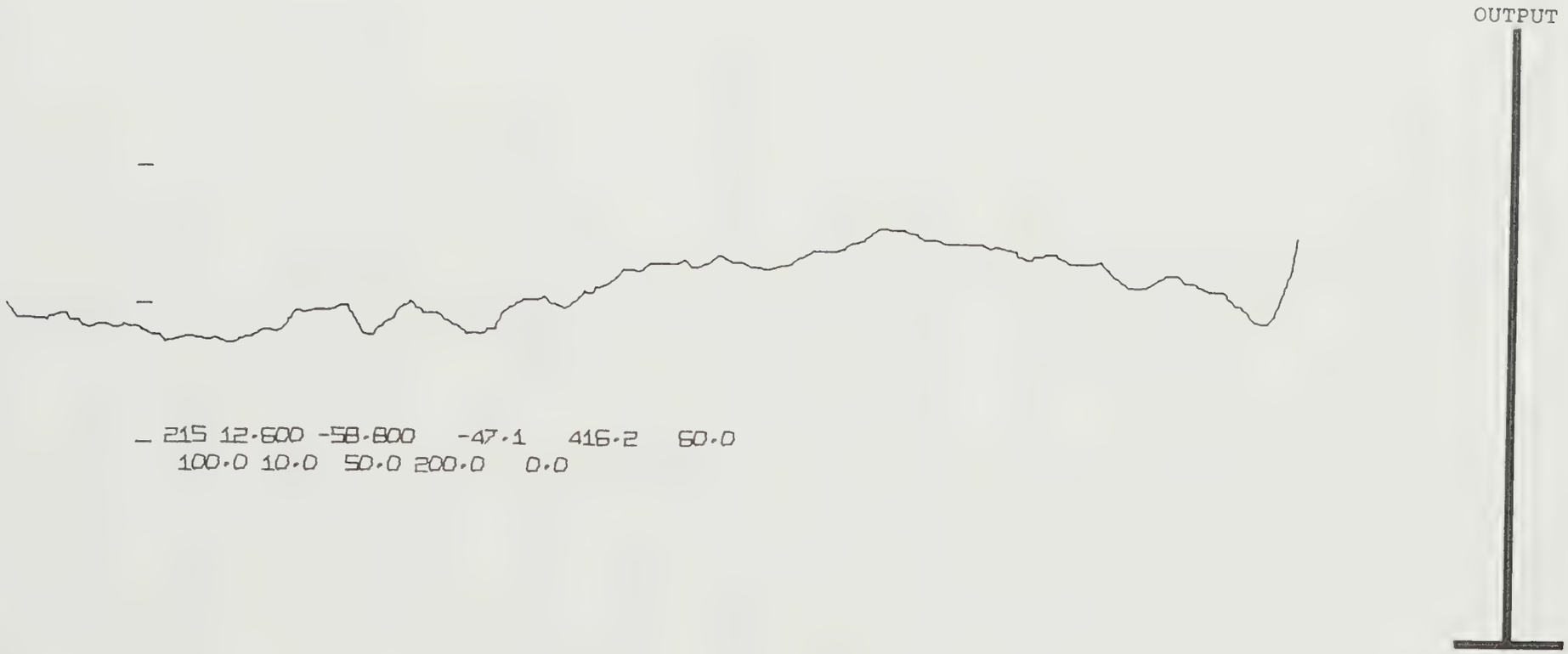
 END OF COMPILATION
```

CONTROL CARDS AND INPUT

```
// JOB    2005 4005
// XEQ MGPR2    1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF1)
      60.     3700.     4100.      12.6     -58.8    1    1 1. 1. 1. 0.  0
     100.       10.       50.      200.        0.        0.
```

OUTPUT

```
NO.POINTS=  215M.LAT=  12.600M.LONG=  -58.800XMIN=  -47.1XMAX=  416.2AZM=   60.
  -47.1  -102  -43.2  -131  -42.5  -133  -41.1  -130  -40.0  -132  -39.2  -131
  -38.3  -132  -36.9  -133  -35.5  -135  -34.1  -133  -32.7  -137  -31.2  -132
  -29.8  -130  -28.4  -128  -26.9  -126  -25.4  -127  -24.0  -138  -22.5  -139
  -21.1  -140  -19.5  -145  -17.5  -149  -15.5  -146  -13.5  -144  -11.6  -144
   -9.4  -149   -7.3  -150   -5.1  -145   -2.9  -149   -0.8  -147    1.3  -152
    3.4  -156    5.6  -160    7.8  -162    9.9  -169   12.1  -167   14.3  -165
   16.4  -163   18.6  -161   20.7  -165   22.9  -167   25.0  -168   27.3  -165
   29.6  -169   31.9  -173   34.1  -174   36.4  -168   38.7  -163   41.0  -163
   43.3  -158   45.6  -155   47.9  -156   50.2  -159   52.5  -150   54.8  -139
   57.1  -127   59.4  -130   61.7  -128   64.0  -125   66.3  -126   68.6  -126
   70.9  -124   73.1  -121   75.4  -118   77.6  -138   79.3  -149   81.1  -162
   82.9  -163   84.6  -165   86.4  -154   88.2  -149   89.9  -144   91.7  -140
   93.5  -129   95.4  -122   97.7  -116  100.1  -125  102.5  -133  104.9  -136
  107.3  -135  113.0  -151  115.5  -155  118.1  -162  120.6  -160  123.1  -165
  125.7  -157  128.2  -155  130.8  -135  133.3  -127  135.8  -119  138.4  -114
  140.9  -115  143.5  -113  146.0  -111  148.5  -121  151.1  -125  153.6  -129
  156.0  -120  158.4  -112  160.4  -105  161.8  -106  163.1  -107  164.5  -100
  167.0   -94  169.5   -91  172.0   -83  174.5   -74  176.9   -72  179.3   -75
  181.8   -70  184.2   -65  186.6   -63  189.0   -63  191.5   -64  193.9   -62
  196.3   -60  198.7   -69  201.2   -70  203.6   -65  206.0   -63  208.4   -54
  210.8   -58  213.3   -65  215.7   -63  218.1   -66  220.5   -71  222.9   -74
  225.4   -74  227.8   -72  230.2   -70  232.6   -68  235.1   -66  237.5   -58
  239.9   -53  242.3   -48  244.7   -47  247.1   -48  249.4   -49  251.8   -47
  254.1   -45  256.5   -37  258.8   -35  261.2   -33  263.5   -25  265.8   -17
  268.2   -15  270.5   -19  272.9   -17  275.2   -20  277.6   -23  279.9   -27
  282.3   -35  284.6   -33  287.0   -36  289.3   -39  291.7   -42  294.0   -39
  296.4   -39  298.8   -42  301.1   -42  303.5   -42  305.8   -48  308.2   -45
  310.5   -48  312.9   -51  315.2   -53  316.5   -59  317.6   -59  318.7   -62
  319.7   -65  320.8   -65  321.9   -60  323.0   -60  324.0   -60  325.1   -61
  326.2   -55  327.5   -56  329.8   -59  332.1   -64  334.4   -70  336.7   -73
  339.1   -69  341.4   -72  343.7   -69  346.0   -66  348.3   -80  350.6   -89
  352.9   -97  355.2  -106  357.6  -108  359.7  -106  362.0  -103  364.3  -100
  366.6   -94  368.9   -88  371.2   -88  373.5   -88  375.8   -99  378.1   -99
  380.3  -105  382.6  -110  384.9  -113  387.2  -115  389.5  -112  391.8  -124
  394.1  -132  396.4  -137  398.7  -146  401.0  -160  403.3  -162  405.5  -159
  407.8  -151  410.1  -130  412.4  -104  414.4   -82  416.2   -38
```


OUTPUT
215 12.600 -58.800 -47.1 416.2 60.0
100.0 10.0 50.0 200.0 0.0

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER,CARD)
*LISTALL
*ONE WORD INTEGERS
C     MMAGD
C MMAGD TO STORE MAGNETICS DATA ON DISK
C     DATA ACCEPTED EITHER GAMMAS OR COUNTS
C     DATA CONSISTS OF DAY CARDS FOLLOWED BY DATA AS A TIME SERIES
C     JDAY,MON,JYR,TZ GIVE DAY,MONTH,YEAR,AND TIME ZONE FOR A DAY CARD.
C     LB IS NO.OF CARDS THAT DAY
C     LC IS NO.OF POINTS LAST CARD
C JCT FIRST TWO DIGITS OF FIELD READING EITHER GAMMAS OR COUNTS AND ARE
C PUNCHED IN DAY CARD
C JG(I) CONSTITUTE REMAINING THREE DIGITS AND ARE PUNCHED IN DATA CARDS.
C IF DATA ARE IN GAMMAS, TOTAL MAGNETICS=(JCT*1000)+JG(I) AND IGNORE JCY
C AND JOSC.
C IF DATA ARE IN PERIOD, TOTAL MAGNETICS=(JOSC*100000*JCY*23.48738)/
C (JG(I)+JCT*1000), WHERE JOSC IS OSCILLATOR FREQUENCY IN HUNDREDS OF
C KC, AND JCY IS NUMBER OF CYCLES FOR WHICH COUNT IS MADE.
C DATA IS REAC AS JHR(I),JMIN(I),JG(I)
C NINE READINGS ARE PUNCHED PER CARD.
C     DATA ARE STORED IN 2 FILES,ONE FILE STORES DAY CARDS(INDEX KS)AND
C     THE OTHER STORES TIME AND CHART VALUES(INDEX KT).
C     FOR MONITORING PURPOSES EACH DAY CARD IS PRINTED OUT.
C     ALSO PRINTED OUT ARE KS(DAY CARD=)AND KT(WHERE KT+1 WILL BE INDEX
C     OF NEXT TIME SERIES POINT STORED).
      DEFINE FILE 15(1000,11,U,INXT)
      DEFINE FILE 16(8000,18,U,INXT)
      DIMENSION JTIM(9),JG(9),JHR(9),JMIN(9)
      KS=0
      KT=0
  204 READ(8,709)JDAY,MON,JYR,TZ,LB,LC,JCT,JCY,JOSC
  709 FORMAT(I2,I3,I5,F5.0,I3,I2,I5,I6,I2)
      KS=KS+1
      WRITE(15'KS)JDAY,MON,JYR,TZ,LB,LC,JCT,JCY,JOSC,KT
      WRITE(5,715)JDAY,MON,JYR,TZ,LB,LC,JCT,JCY,JOSC,KT,KS
  715 FORMAT(I3,I3,I5,F5.0,I3,I3,5I5)
      IF(JDAY)201,201,202
  202 DO 203 L=1,LB
      READ(8,710)(JHR(I),JMIN(I),JG(I),I=1,9)
  710 FORMAT(9(I2,I2,I3,1X))
      KT=KT+1
      DO 205 I=1,9
  205 JTIM(I)=JHR(I)*100+JMIN(I)
      WRITE(16'KT)(JTIM(I),JG(I),I=1,9)
```

```
  203 CONTINUE
      GO TO 204
  201 CALL EXIT
      END
VARIABLE ALLOCATIONS
    TZ(R )=000E        JTIM(I )=0018-0010    JG(I )=0021-0019   JHR(I )=002A-0022  JMIN(I )=0033-002B  INXT(I )=0034
    KS(I )=0035          KT(I )=0036       JDAY(I )=0037        MON(I )=0038        JYR(I )=0039          LB(I )=003A
    LC(I )=003B         JCT(I )=003C        JCY(I )=003D       JOSC(I )=003E          L(I )=003F           I(I )=0040

STATEMENT ALLOCATIONS
 709  =004A  715  =0054  710  =005D  204  =0085  202  =00D6  205  =00FE  203  =012E  201  =0139

FEATURES SUPPORTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 FLD     FSTO    TYPEZ   CARDZ   WCHRI   READZ   SRED    SWRT    SCOMP   SFIO    SIOIX   SIOF    SIOI    SUBSC   PRNZ
 SDFIO   SDWRT   SDCOM   SDIX    SDF     SDI

INTEGER CONSTANTS
     0=0042      8=0043      1=0044     15=0045      5=0046      9=0047    100=0048     16=0049

CORE REQUIREMENTS FOR
 COMMON      0  VARIABLES     66  PROGRAM    248

 END OF COMPILATION
```

```
// JOB     2005 4005
// DUP
*STOREDATA  WS  UA  G2413    7       4005
*STOREDATA  WS  UA  H2413   35       4005
// XEQ MMAGD     1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF1)


17 11 1967 02.0  1 1   96  1000 1
1130050
17 11 1967 02.0  1 1   95  1000 1
1134967
17 11 1967 02.0  1 1   96  1000 1
1136035
17 11 1967 02.0  1 3   95  1000 1
1137890 1139990 1141845
17 11 1967 02.0  1 1   96  1000 1
1145150
17 11 1967 02.0  1 1   95  1000 1
1152930
17 11 1967 02.0  1 9   96  1000 1
1200185 1203300 1210020 1212300 1218135 1223150 1224400 1230140 1248140
17 11 1967 02.0  1 2   95  1000 1
1315985 1319570
17 11 1967 02.0  1 1   96  1000 1
1321350
17 11 1967 02.0  1 1   97  1000 1
1322075
17 11 1967 02.0  1 4   96  1000 1
1325635 1327390 1329920 1339125
17 11 1967 02.0  1 1   97  1000 1
1343270
17 11 1967 02.0  3 6   96  1000 1
1345975 1350510 1400470 1406515 1422220 1430415 1440490 1450400 1500250
1508430 1511290 1515555 1521480 1524570 1528480 1530575 1535740 1544540
1547760 1556660 1559360 1600475 1602880 1609445
17 11 1967 02.0  1 1   97  1000 1
1612115
17 11 1967 02.0  1 1   96  1000 1
1616985
17 11 1967 02.0  1 1   97  1000 1
1619600
17 11 1967 02.0  1 1   96  1000 1
1623250
17 11 1967 02.0  1 1   97  1000 1
1627280
17 11 1967 02.0  1 1   96  1000 1
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1630605
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1635580 1638070 1640275
17 11 1967 02.0  1 1   96  1000 1
1643710
17 11 1967 02.0  1 1   97  1000 1
1650150
17 11 1967 02.0  1 1   96  1000 1
1653950
17 11 1967 02.0  1 1   97  1000 1
1655730
17 11 1967 02.0  1 2   96  1000 1
1700315 1701280
17 11 1967 02.0  1 1   97  1000 1
1705870
17 11 1967 02.0  1 1   96  1000 1
1710005
17 11 1967 02.0  1 1   97  1000 1
1715070
17 11 1967 02.0  1 5   96  1000 1
1720583 1724780 1727520 1730695 1735145
17 11 1967 02.0  1 1   95  1000 1
1738820
17 11 1967 02.0  1 4   96  1000 1
1740640 1742367 1744570 1747180
17 11 1967 02.0  1 1   97  1000 1
1752900
17 11 1967 02.0  1 4   98  1000 1
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17 11 1967 02.0  1 1   99  1000 1
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17 11 1967 02.0  1 3   98  1000 1
1820250 1823770 1830150
17 11 1967 02.0  1 8   97  1000 1
1930695 1940400 1945450 1954440 2000130 2010020 2016090 2020015
17 11 1967 02.0  2 4   96  1000 1
2025940 2030850 2040620 2045630 2050710 2055605 2100565 2111600 2117490
2123500 2125540 2130400 2134450
17 11 1967 02.0  1 3   95  1000 1
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17 11 1967 02.0  2 3   96  1000 1
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2230720 2231740 2236620
17 11 1967 02.0  1 3   97  1000 1
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17 11 1967 02.0  1 3   98  1000 1
2320002 2325125 2330050
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0900110 0910095 0920070 0930030
18 11 1967 02.0  6 9   96  1000 1
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1110600 1120550 1130505 1140420 1150440 1200440 1210470 1220540 1230640
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1340950 1350915 1400875 1405850 1410820 1415790 1420745 1425700 1430660
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18 11 1967 02.0  1 9   95  1000 1
1650970 1655940 1700910 1710880 1720860 1730850 1740860 1745905 1750950
18 11 1967 02.0  6 3   96  1000 1
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1840540 1845580 1850620 1855660 1900690 1910750 1920790 1930820 1940800
1950750 2000680 2005650 2010615 2015570 2020540 2025500 2030470 2035460
2040460 2045480 2050510 2055555 2100598 2110605 2120680 2130670 2140650
2150625 2200585 2205550 2210515 2215470 2220420 2225363 2230300 2235245
2240180 2245115 2250050
18 11 1967 02.0  2 3   95  1000 1
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2345560 2350605 2355650
19 11 1967 02.0  1 9   95  1000 1
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19 11 1967 02.0  4 5   96  1000 1
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0250230 0300240 0310240 0320230 0330180 0335160 0340130 0345090 0350060
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0530090 0540090 0550085 0600055 0610005
19 11 1967 02.0  3 2   95  1000 1
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0710610 0715640 0720680 0725720 0730765 0735795 0740830 0745860 0750890
0800940 0805965
19 11 1967 02.0  3 1   96  1000 1
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0940010
19 11 1967 02.0  4 7   95  1000 1
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1435275 1440240 1445190 1450160 1455130 1500120 1510150 1515195 1520230
1525280 1530320 1535370 1540412 1545455 1550500 1555535 1600570 1610605
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19 11 1967 02.0  2 5   96  1000 1
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2005670 2010615 2015560 2020510 2025455 2030400 2035325 2040250 2045133
2050100 2055045
19 11 1967 02.0  1 5   94  1000 1
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19 11 1967 02.0  3 7   95  1000 1
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2215565 2220600 2230630 2240620 2250615 2300590 2310550 2315510 2320460
2325415 2330360 2335305 2340250 2345190 2350135 2355080
20 11 1967 02.0  1 1   95  1000 1
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20 11 1967 02.0  2 1   94  1000 1
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20 11 1967 02.0  4 5   95  1000 1
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0710130 0720120 0730100 0740080 0750030
20 11 1967 02.0  8 8   94  1000 1
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0845850 0850915 0855960 0900960 0905970 0910950 0915918 0920860 0925807
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1200830 1210820 1213810 1900890 1905870 1915830 1920790 1930730 1940710
1950730 2000755 2010785 2020800 2030777 2040745 2050730 2100750 2105770
2110805 2120870 2130912 2140930 2150920 2200900 2210880 2220850 2230830
2240810 2250807 2300795 2310760 2320740 2330710 2340680 2350650
21 11 1967 02.0  8 1   94  1000 1
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0130640 0140620 0150570 0200515 0210450 0220430 0230420 0240410 0250400
0300380 0310367 0320370 0330350 0340330 0350315 0400330 0405360 0410380
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0540510 0550540 0600530 0610475 0620470 0630470 0640455 0650415 0700380
0705350 0710325 0715295 0720270 0730230 0740205 0750190 0800180 0810150
0820140 0830150 0840170 0850190 0900185 0910150 0920100 0930080 0940060
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21 11 1967 02.0  3 4   93  1000 1
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21 11 1967 02.0  1 5   94  1000 1
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21 11 1967 02.0 11 3   93  1000 1
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1750640 1800650 1810680 1820715 1830740 1840750 1850730 1900675 1910650
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2010820 2015850 2020880 2030910 2040920 2050900 2100890 2105860 2112895
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2330475 2340470 2350450
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0920100 0930070 0940045 0950040
22 11 1967 02.0 10 8   92  1000 1
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1100840 1110860 1120870 1130860 1140830 1145800 1150770 1155730 1200695
1205660 1210635 1215610 1220580 1230550 1240540 1250530 1300525 1310510
1320500 1330500 1340530 1350570 1400615 1410640 1420650 1430630 1440590
1445560 1450530 1500500 1510510 1520530 1525550 1530570 1540560 1545540
1900650 1910680 1920740 1930800 1940820 1950810 2000760 2010720 2015690
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2210735 2215700 2220655 2225630 2230590 2235580 2240555 2245540 2250520
2255500 2300480 2310470 2320445 2330415 2340430 2350455 2355490
23 11 1967 02.0  1 8   92  1000 1
0000415 0005565 0010615 0015680 0020745 0025855 0030890 0035955
23 11 1967 02.0  1 1   93  1000 1
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0600120 0610110 0620135 0625160 0630180 0635210 0640240 0645250 0650270
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0830140 0840120 0850150 0855180 0900200 0905220 0910240 0915270 0920290
0930300 0940300 0950280 0955270 1000240 1010210 1020180 1030180 1040190
1050180 1100155 1110135 1120110 1130100 1140065 1150040 1155020
23 11 1967 02.0  3 3   91  1000 1
1200995 1210940 1220930 1230910 1240900 1250880 1300890 1310900 1320930
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1500970 1510970 1520999
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23 11 1967 02.0  1 4   92  1000 1
1530050 1540060 1550050 1555015
23 11 1967 02.0  4 3   91  1000 1
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1655670 1700690 1705720 1710755 1715770 1720800 1730830 1740860 1750880
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1930955 1940970 1950990
23 11 1967 02.0  1 1   92  1000 1
2000005
23 11 1967 02.0  2 1   91  1000 1
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23 11 1967 02.0  1 6   92  1000 1
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23 11 1967 02.0  3 2   91  1000 1
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24 11 1967 02.0  6 6   91  1000 1
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0715550 0720520 0725485 0730450 0735425 0740400 0745365 0750330 0755280
0800228 0810190 0820150 0830130 0840105 0850055
24 11 1967 02.0  2 3   90  1000 1
0900990 0910965 0920920 0930890 0940840 0950810 1000780 1010800 1015820
1020865 1025915 1030970
24 11 1967 02.0  1 1   91  1000 1
1036050
24 11 1967 02.0  1 9   90  1000 1
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24 11 1967 02.0  2 8   91  1000 1
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24 11 1967 02.0  2 3   90  1000 1
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24 11 1967 02.0  1 7   90  1000 1
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24 11 1967 02.0  1 3   91  1000 1
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24 11 1967 02.0  3 7   90  1000 1
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2000990 2010990 2020985 2030970 2040940 2050915 2100900 2110880 2120830
2130760 2140730 2150705 2200675 2210660 2220630 2230615 2240600 2250595
2300565 2310530 2315490 2320470 2330465 2340463 2350455
25 11 1967 02.0  6 3   90  1000 1
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0130275 0140260 0150240 0200230 0210220 0220215 0230225 0240255 0250300
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0550060 0600060 0610020
25 11 1967 02.0  1 7   89  1000 1
0615935 0620880 0625800 0630750 0635755 0640830 0645920
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0650060 0655160 0700245 0705270 0710250 0715190 0720100 0725022
25 11 1967 02.0  6 4   89  1000 1
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Input data must be followed by a blank card.

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25	11	1967	2.	2	8	88	1000	1	224	101
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```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*LISTALL
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*ONE WORD INTEGERS
C     NIGRF   (ADAPTED FROM MGNAV)
C     ADDS THEORETICAL FIELD AT EACH NAVIGATION POINT TO B FILE
C     THE INTRNATIONAL GEOMAGNETIC REFERENCE FIELD APPLIES TO DATA
C    1  RECORDED DURING THE PERIOD 1955.0 TO 1972.0
C     EPOCH 1965.0
C     BEFORE 1955 USE FIELD OF VESTINE ET AL..,EPOCH 1945.0
C     FILE 7 EQUALS CF2 WHICH CONTAINS GAUSS NORMALISED IGRF COEFFICIENT
C     PROGRAM REQUIRES 3-5 SECONDS PER NAVIAGION POINT.
C     LAST AMENDED MARCH 1969
      DEFINE FILE 7(66,12,U,INXT)
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(1300,15,U,INXT)
      DIMENSION P(9,9),DP(9,9),CONST(45),SP(9),CP(9),TG(45),TH(45),
     1G(45),H(45),GT(45),HT(45),GTT(45),HTT(45)
      DO 5011 KKK=1,45
      TG(KKK)=0.
 5011 TH(KKK)=0.
      DO 8N=1,8
      NN=N+1
      DO 8M=1,NN
      P(N,M)=1.0
    8 DP(N,M)=1.0
      DP(1,1)=0.0
      SP(1)=0.0
      CP(1)=1.0
      TN=100.0
      A=6378.165
      FLAT=1.-1./298.25
      A2=A**2
      A4=A**4
      B2=(A*FLAT)**2
      A2B2=A2*(1.-FLAT**2)
      A4B4=A4*(1.-FLAT**4)
      FAC=B2/A2
      CONST(2)=0.0
      CONST(3)=0.0
      II=4
      III=6
      FLN=3.
   76 FLM=1
      DO 4 K=II,III
      CONST(K)=((FLN-2.)**2-(FLM-1.)**2)/((FLN*2.-3.)*(FLN*2.-5.))
```

```
      FLM=FLM+1.
    4 CONTINUE
      IF(III-44)89,698,698
   89 IC=III-II+1
      II=III+1
      III=II+IC
      FLN=FLN+1.
      GO TO 76
  698 DO 99 KK=2,45
      READ(7'KK)G(KK),H(KK),GT(KK),HT(KK),GTT(KK),HTT(KK)
   99 CONTINUE
      READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      DO 95 IK=1,I
      READ(1'IK)TNAV,PLAT,PLNG,SETE,TZ
      RLAT=PLAT/57.29578
      RLONG=PLNG/57.29578
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      TM=TNAV/8760.+JBSYR+1.-1965.
      IF((FABS(TM-TN))-0.01)999,999,689
  689 DO 109 KK=2,45
      TG(KK)=G(KK)+TM*GT(KK)
  109 TH(KK)=H(KK)+TM*HT(KK)
      TN=TM
  999 SINLA=FSIN(RLAT)
      CP(2)=FCOS(RLONG)
      SP(2)=FSIN(RLONG)
      DO 10 M=3,9
      SP(M)=SP(2)*CP(M-1)+CP(2)*SP(M-1)
   10 CP(M)=CP(2)*CP(M-1)-SP(2)*SP(M-1)
      SINL2=SINLA**2
      DEN2=A2-A2B2*SINL2
      DEN=FSQRT(DEN2)
      R=FSQRT((A4-A4B4*SINL2)/DEN2)
      THETA=FATAN(FAC*SINLA/(1.E-30+FSQRT(1.-SINL2)))
      CT=FSIN(THETA)
      ST=FSQRT(1.0-CT**2)
      AOR=6371.2/R
      AR=AOR**2
      BN=0.
      BE=0.
      BV=0.
      TEMP=0.
      KK=2
      DO 54 N=2,9
      FN=N
      AR=AOR*AR
      DO 54 M=1,N
      IF (N-M) 12,11,12
```

```
   11 P(N,N)=ST*P(N-1,N-1)
      DP(N,N)=ST*DP(N-1,N-1)+CT*P(N-1,N-1)
      GO TO 13
   12 IF(N-2)2011,2012,2011
 2012 GP=1.
      GDP=1.
      GO TO 2010
 2011 GDP=DP(N-2,M)
      GP=P(N-2,M)
 2010 P(N,M)=CT*P(N-1,M)-CONST(KK)*GP
      DP(N,M)=CT*DP(N-1,M)-ST*P(N-1,M)-CONST(KK)*GDP
   13 PNM=P(N,M)*AR
      TEMP=TG(KK)*CP(M)+TH(KK)*SP(M)
      BN=BN-TEMP*DP(N,M)*AR
      BM=M-1
      BE=BE-(TG(KK)*SP(M)-TH(KK)*CP(M))*BM*PNM/ST
      BV=BV+TEMP*FN*PNM
      KK=KK+1
   54 CONTINUE
      RES=FSQRT(BN*BN+BE*BE+BV*BV)
      WRITE(5,701)PLAT,PLNG,RES
  701 FORMAT(1H ,F10.1,F10.1,F10.1)
      RES=RES-50000.
      IRES=RES
      WRITE(1'IK)TNAV,PLAT,PLNG,SETE,TZ,IRES
   95 CONTINUE
      WRITE(5,702)
  702 FORMAT(' CALL EXIT')
      CALL EXIT
      END
VARIABLE ALLOCATIONS
     P(R )=00B6-0016    DP(R )=0158-00B8 CONST(R )=01B2-015A    SP(R )=01C4-01B4    CP(R )=01D6-01C6    TG(R )=0230-01D8
    TH(R )=028A-0232     G(R )=02E4-028C     H(R )=033E-02E6    GT(R )=0398-0340    HT(R )=03F2-039A   GTT(R )=044C-03F4
   HTT(R )=04A6-044E    TN(R )=04A8          A(R )=04AA       FLAT(R )=04AC         A2(R )=04AE         A4(R )=04B0
    B2(R )=04B2       A2B2(R )=04B4       A4B4(R )=04B6        FAC(R )=04B8        FLN(R )=04BA        FLM(R )=04BC
  DISA(R )=04BE       DMAX(R )=04C0      CRUIS(R )=04C2       TNAV(R )=04C4       PLAT(R )=04C6       PLNG(R )=04C8
  SETE(R )=04CA         TZ(R )=04CC       RLAT(R )=04CE      RLONG(R )=04D0         TM(R )=04D2      SINLA(R )=04D4
 SINL2(R )=04D6       DEN2(R )=04D8        DEN(R )=04DA          R(R )=04DC      THETA(R )=04DE         CT(R )=04E0
    ST(R )=04E2        AOR(R )=04E4         AR(R )=04E6         BN(R )=04E8         BE(R )=04EA         BV(R )=04EC
  TEMP(R )=04EE         FN(R )=04F0         GP(R )=04F2        GDP(R )=04F4        PNM(R )=04F6         BM(R )=04F8
   RES(R )=04FA       INXT(I )=0504        KKK(I )=0505          N(I )=0506         NN(I )=0507          M(I )=0508
    II(I )=0509        III(I )=050A          K(I )=050B         IC(I )=050C         KK(I )=050D          I(I )=050E
 JBSYR(I )=050F         IK(I )=0510       IRES(I )=0511

STATEMENT ALLOCATIONS
 701  =0541  702  =0547  5011 =0574  8    =059C  76   =061C  4    =0656  89   =0665  698  =0681  99   =0699  7002 =06D2
 7001 =06D8  7003 =06DC  689  =06FB  109  =070C  999  =0723  10   =075C  11   =0804  12   =082E  2012 =0834  2011 =083E
 2010 =084F  13   =088E  54   =08FC  95   =094E

FEATURES SUPPORTED
 ONE WORD INTEGERS
```

```
 IOCS

CALLED SUBPROGRAMS
 FABS    FSIN    FCOS    FSQRT   FATAN   FADDX   FSUB    FMPY    FMPYX   FDIV    FLD     FLDX    FSTO    FSTOX   FSBR
 FDVR    FAXI    IFIX    FLOAT   TYPEZ   WCHRI   READZ   SWRT    SCOMP   SFIO    SIOF    SUBSC   PRNZ    SDFIO   SDREO
 SDWRT   SDCOM   SDFX    SDF     SDI

REAL CONSTANTS
  .000000E 00=0516    .100000E 01=0518    .100000E 03=051A    .637816E 04=051C    .298250E 03=051E    .300000E 01=0520
  .200000E 01=0522    .500000E 01=0524    .572957E 02=0526    .876000E 04=0528    .196500E 04=052A    .100000E-01=052C
  .100000E-29=052E    .637120E 04=0530    .500000E 05=0532

INTEGER CONSTANTS
     1=0534     45=0535      8=0536      2=0537      4=0538      6=0539     44=053A      7=053B      3=053C   1959=053D
  1970=053E      9=053F      5=0540

CORE REQUIREMENTS FOR
 COMMON      0  VARIABLES   1302  PROGRAM   1094

 END OF COMPILATION
```


CONTROL CARDS AND INPUT

```
// JOB
// XEQ NIGRF    1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF2)
```

Only the first and last pages of NIGRF output are given here.

OUTPUT

```
    -23.0      -43.1   24029.5
    -23.0      -43.1   24029.4
    -23.1      -42.9   24032.6
    -23.1      -42.8   24035.2
    -23.1      -42.8   24035.8
    -23.1      -42.6   24044.8
    -23.1      -42.5   24046.8
    -23.1      -42.5   24049.0
    -23.1      -42.0   24069.1
    -23.1      -41.8   24080.0
    -23.1      -41.6   24091.0
    -23.2      -41.2   24106.6
    -23.2      -40.8   24127.3
    -23.2      -40.7   24132.0
    -23.2      -40.7   24134.6
    -23.2      -40.3   24153.9
    -23.2      -40.2   24160.7
    -23.3      -39.8   24185.6
    -23.3      -39.8   24186.5
```

```
      25.6      -76.9   49217.3
      25.6      -77.1   49244.6
      25.7      -77.2   49285.4
      25.8      -77.7   49400.7
      25.8      -77.8   49425.9
      25.9      -78.2   49493.7
      25.9      -78.3   49505.4
      26.0      -78.6   49563.7
      26.0      -78.8   49605.6
      26.0      -78.9   49617.1
      26.1      -79.1   49657.5
      26.0      -79.4   49640.9
      26.1      -79.5   49656.1
      26.1      -80.0   49732.6
      26.0      -80.0   49668.1
      26.0      -80.0   49625.9
      26.0      -80.0   49627.9
      25.9      -80.0   49596.6
      25.9      -80.0   49590.6
      25.8      -80.0   49542.1
CALL EXIT
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000

// FOR
*IOCS(2501READER,1403PRINTER,KEYBOARD,TYPEWRITER,DISK,PLOTTER)
*LISTALL
*ONE WORD INTEGERS
C PRMG2
C ADDITIONAL SUBROUTINE PREPL
C       PRELIMINARY AND PREFINAL REDUCTION OF MAGNETICS FROM DISK STORAGE.
C      TO COMPUTE RESIDUAL AT EACH DATA POINT AND GIVE PRELIMINARY PLOT
C      WITH OPTION OF LISTING AND TWO PLOTTING SCALES.
C      NSS2 NONZERO TO LIST OUTPUT
C      NSS3=0 FOR DATA IN GAMMAS,=1 FOR GAMMA COUNTS (EG VEMA),NSS5=1 TO PLOT
C      NSS6=1 TO PLOT AT 50 MILES 500 GAMMAS TO THE INCH PRELIMINARY PLOT
C      NSS6=2 TC PLOT PRE-FINAL  100 MI PER INCH 500 GAMMAS PER INCH
C KS MAGNETIC DAYS ARE SKIPPED
C ZERO LINE ALONG R.H. MARGIN OF PLOTTER IS AT (-1700-CONST) GAMMAS.
C POINTS BETWEEN XMIN AND XMAX N. MILES ALONG TRACK ARE PLOTTED.
      DEFINE FILE 3 (1,10,U,INXT)
      DEFINE FILE 1(2500,15,U,INXT)
      DEFINE FILE 15(1000,11,U,INXT)
      DEFINE FILE 16(8000,18,U,INXT)
      COMMON AM(12),AY(11),B(160)
      INT=1
      XXE=0.0
      XXN=0.0
      XXD=0.0
      PLAT1=0.0
      PLNG1=0.0
      PLAT2=0.0
      PLNG2=0.0
      INDEX=1
      JENT=1
      GLAT=0.0
      GLONG=0.0
      GDIS=0.0
      RESID=0.0
      TI=0.
      READ(8,2)NSS2,NSS3,NSS5,NSS6,CONST,XMIN,XMAX,KS
    2 FORMAT(4I2,3F10.3,I5)
      IF(NSS5-1)4012,750,4012
  750 CALL PREPL(GDIS,GLAT,GLONG,RESID,NSS6,CONST,INT,XMAX)
 4012 CALL DMAG2(XMIN,XMAX,NSS3,JENT,GLAT,GLONG,GDIS,RESID,INDEX,NSS2,XXE,XXN
     1E,XXN,XXD,PLAT1,PLNG1,PLAT2,PLNG2,TI,KS)
      GO TO(404,404,402),JENT
  404 IF(NSS5-1)4012,40,4012
   40 CALL PREPL(GDIS,GLAT,GLONG,RESID,NSS6,CONST,2,XMAX)
      IF(GDIS-XMAX)4012,402,402
```

```
  402 CALL EXIT
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92   XXE(R )=001C        XXN(R )=001E        XXD(R )=0020
 PLAT1(R )=0022       PLNG1(R )=0024       PLAT2(R )=0026       PLNG2(R )=0028       GLAT(R )=002A       GLONG(R )=002C
  GDIS(R )=002E       RESID(R )=0030          TI(R )=0032       CONST(R )=0034       XMIN(R )=0036        XMAX(R )=0038
  INXT(I )=003A         INT(I )=003B       INDEX(I )=003C        JENT(I )=003D       NSS2(I )=003E        NSS3(I )=003F
  NSS5(I )=0040        NSS6(I )=0041          KS(I )=0042

STATEMENT ALLCCATIONS
 2    =0049  750  =00BD  4012 =00C7  404  =00E3  40   =00E9  402  =00FA

FEATURES SUPPCRTED
 ONE WORD INTEGERS
 IOCS

CALLED SUBPROGRAMS
 PREPL   DMAG2   FSUB    FLD     FSTO    TYPEZ   WCHRI   READZ   SRED    SFIO    SIOF    SIOI    PRNZ    SDFIO

REAL CONSTANTS
  .000000E 00=0044

INTEGER CONSTANTS
     1=0046      8=0047      2=0048

CORE REQUIREMENTS FOR
 COMMON    366  VARIABLES     68  PROGRAM    184

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          3005        0001

// FOR
*TRANSFER TRACE
*ARITHMETIC TRACE
*LISTALL
      SUBROUTINE PREPL(GDIS,GLAT,GLONG,DEL,NSS6,CONST,INT,XMAX)
C     PRELIMINARY AND PRE-FINAL PLOTTING SUBROUTINE
      GO TO(10,20),INT
   10 YMIN=-1700.-CONST
      CALL SCALF(.01,.002,XMIN,YMIN)
      MMM=0
      ILONG=0
      IX=(XMAX-XMIN+100.)/100.
      AX=IX
      AX=AX*50.
      IF(AX-1000.)96,96,30
   96 AX=AX*2.0
   30 RETURN
   20 GO TO(5189,5788),NSS6
C     TO PLOT RESIDUAL
 5189 IF(GDIS-AX)4048,4048,5047
 5047 CALL FPLOT(1,XMIN,6300.)
      CALL SCALF(0.01,0.002,AX,YMIN)
      AX=2.0*AX
 4048 GDIS=2.0*GDIS
 5788 ATI=DEL
 4047 IF(GDIS)30,4013,4013
 4013 Y=ATI
   86 IF(MMM)7007,7006,7007
 7006 CALL FPLOT(-2,GDIS,Y)
      MMM=1
      GO TO 87
 7007 CALL FPLOT(2,GDIS,Y)
   87 XX=GDIS+1.25
      XXX=XX-2.50
      YY=Y+.025
      YYY=YY-.05
      CALL FPLOT(0,GDIS,YY)
      CALL FPLOT(0,GDIS,YYY)
      CALL FPLOT(0,GDIS,Y)
      CALL FPLOT(0,XX,Y)
      CALL FPLOT(0,XXX,Y)
      CALL FPLOT(0,GDIS,Y)
      GO TO(31,30),NSS6
   31 GDIS=GDIS/2.0
```

```
      GO TO 30
      END
VARIABLE ALLOCATIONS
  YMIN(R )=0000       XMIN(R )=0002        AX(R )=0004        ATI(R )=0006          Y(R )=0008          XX(R )=000A
   XXX(R )=000C         YY(R )=000E       YYY(R )=0010        MMM(I )=0014      ILONG(I )=0016          IX(I )=0018

UNREFERENCED STATEMENTS
 4047    86

STATEMENT ALLOCATIONS
 10    =005B  96    =008D  30    =0093  20    =0095  5189 =009A  5047 =00A1  4048 =00B2  5788 =00B8  4047 =00BC  4013 =00C1
 86    =00C5  7006 =00CA  7007 =00DA  87    =00DF  31    =011A

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE

CALLED SUBPROGRAMS
 SCALF   FPLOT   FSUB    FMPY    FDIV    FLD     SFAR    SIAR    IFIX    FLOAT   SIIF    SFIF    SGOTO   SNR     SUBIN

REAL CONSTANTS
  .170000E 04=001A    .100000E-01=001C    .200000E-02=001E    .100000E 03=0020    .500000E 02=0022    .100000E 04=0024
  .200000E 01=0026    .630000E 04=0028    .125000E 01=002A    .250000E 01=002C    .250000E-01=002E    .500000E-01=0030

INTEGER CONSTANTS
     0=0032      1=0033      2=0034

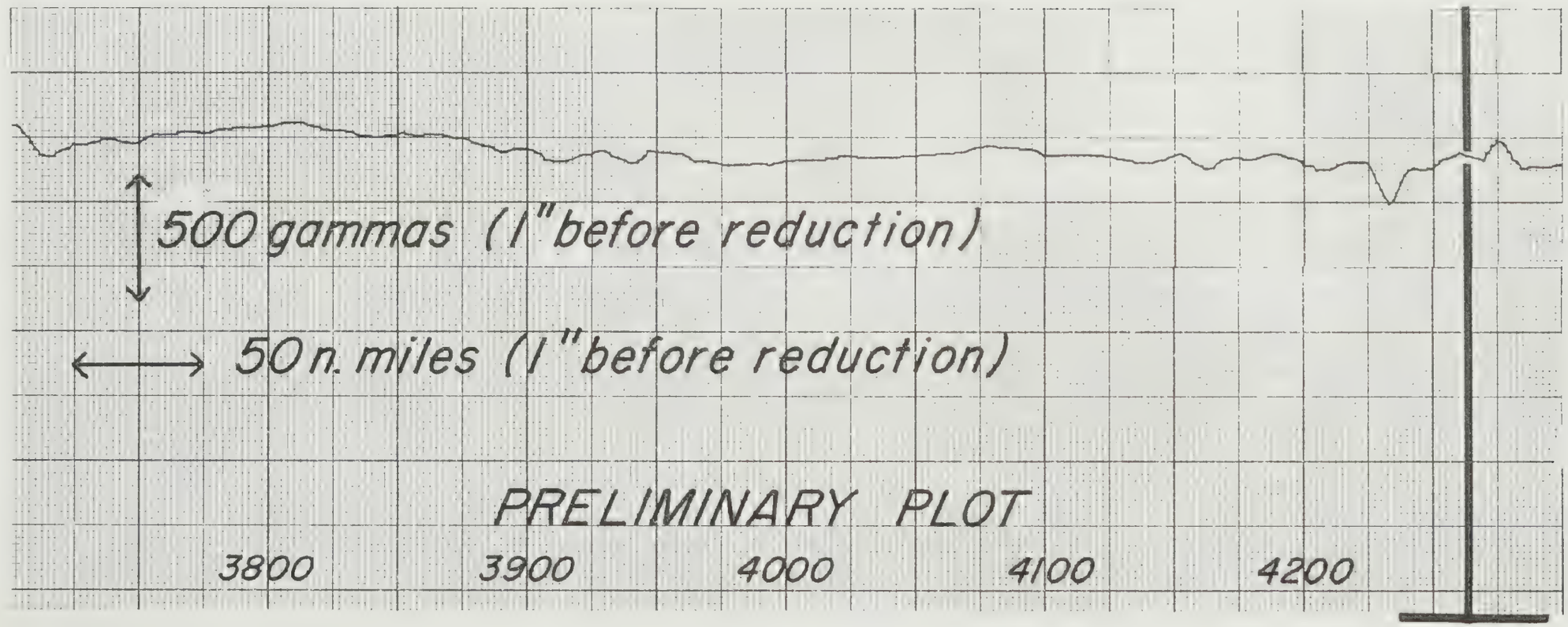
CORE REQUIREMENTS FOR PREPL
 COMMON      0  VARIABLES     26  PROGRAM    264

 END OF COMPILATION
```

```
// JOB     2005 4005
// XEQ PRMG2     1
*FILES(1,B2413),(3,A2413),(15,G2413),(16,H2413),(7,CF1)
 1 1 1 1          0.      3700.      4500.     0
```

CONTROL CARDS
AND INPUT

OUTPUT



Only the first and last pages of PRMG2 are given here.

OUTPUT

1640	5	12	3.0	11.754	-53.885	3700.2	36664.	36670.	-6.	67	V24
1650	5	12	3.0	11.781	-53.885	3701.8	36681.	36686.	-4.	67	V24
1700	5	12	3.0	11.808	-53.885	3703.4	36684.	36702.	-17.	67	V24
1710	5	12	3.0	11.811	-53.913	3705.1	36676.	36710.	-33.	67	V24
1720	5	12	3.0	11.816	-53.940	3706.7	36667.	36718.	-51.	67	V24
1730	5	12	3.0	11.821	-53.964	3708.1	36653.	36727.	-73.	67	V24
1740	5	12	3.0	11.826	-53.991	3709.7	36636.	36735.	-99.	67	V24
1750	5	12	3.0	11.831	-54.018	3711.4	36624.	36744.	-120.	67	V24
1800	5	12	3.0	11.836	-54.045	3713.0	36624.	36753.	-129.	67	V24
1810	5	12	3.0	11.841	-54.073	3714.6	36630.	36762.	-132.	67	V24
1820	5	12	3.0	11.846	-54.100	3716.2	36641.	36771.	-130.	67	V24
1830	5	12	3.0	11.852	-54.127	3717.9	36664.	36780.	-116.	67	V24
1840	5	12	3.0	11.857	-54.154	3719.5	36681.	36789.	-107.	67	V24
1850	5	12	3.0	11.862	-54.182	3721.1	36696.	36798.	-102.	67	V24
1900	5	12	3.0	11.867	-54.209	3722.8	36713.	36807.	-94.	67	V24
1910	5	12	3.0	11.872	-54.236	3724.4	36733.	36816.	-83.	67	V24
1920	5	12	3.0	11.877	-54.263	3726.0	36739.	36825.	-86.	67	V24
1930	5	12	3.0	11.883	-54.291	3727.7	36750.	36834.	-83.	67	V24
1940	5	12	3.0	11.888	-54.318	3729.3	36762.	36843.	-81.	67	V24
1950	5	12	3.0	11.893	-54.345	3730.9	36776.	36852.	-75.	67	V24
2000	5	12	3.0	11.898	-54.373	3732.5	36791.	36861.	-70.	67	V24
2010	5	12	3.0	11.903	-54.400	3734.2	36799.	36870.	-70.	67	V24
2020	5	12	3.0	11.908	-54.427	3735.8	36819.	36879.	-59.	67	V24
2030	5	12	3.0	11.913	-54.454	3737.4	36828.	36888.	-59.	67	V24
2040	5	12	3.0	11.919	-54.482	3739.1	36837.	36897.	-59.	67	V24
2050	5	12	3.0	11.924	-54.509	3740.7	36840.	36906.	-66.	67	V24
2100	5	12	3.0	11.929	-54.536	3742.3	36842.	36915.	-72.	67	V24
2110	5	12	3.0	11.934	-54.563	3744.0	36848.	36923.	-75.	67	V24
2120	5	12	3.0	11.939	-54.591	3745.6	36854.	36932.	-78.	67	V24
2130	5	12	3.0	11.944	-54.617	3747.1	36860.	36942.	-81.	67	V24
2140	5	12	3.0	11.949	-54.644	3748.8	36871.	36951.	-79.	67	V24
2150	5	12	3.0	11.955	-54.672	3750.4	36889.	36960.	-70.	67	V24
2200	5	12	3.0	11.960	-54.699	3752.1	36906.	36969.	-62.	67	V24
2210	5	12	3.0	11.965	-54.727	3753.7	36924.	36978.	-54.	67	V24
2220	5	12	3.0	11.970	-54.754	3755.4	36947.	36987.	-40.	67	V24
2230	5	12	3.0	11.975	-54.782	3757.0	36953.	36996.	-43.	67	V24
2240	5	12	3.0	11.981	-54.809	3758.7	36958.	37005.	-46.	67	V24
2250	5	12	3.0	11.986	-54.837	3760.3	36970.	37014.	-44.	67	V24
2300	5	12	3.0	11.991	-54.865	3762.0	36976.	37023.	-47.	67	V24
2310	5	12	3.0	11.996	-54.892	3763.6	36988.	37032.	-44.	67	V24
2320	5	12	3.0	12.001	-54.920	3765.3	37002.	37041.	-39.	67	V24
2330	5	12	3.0	12.007	-54.947	3766.9	37017.	37051.	-33.	67	V24
2340	5	12	3.0	12.012	-54.975	3768.5	37028.	37060.	-31.	67	V24
2350	5	12	4.0	12.015	-54.991	3769.5	37034.	37065.	-30.	67	V24
2300	5	12	4.0	12.020	-55.005	3770.4	37034.	37070.	-36.	67	V24
2310	5	12	4.0	12.024	-55.019	3771.2	37040.	37076.	-36.	67	V24
2320	5	12	4.0	12.029	-55.033	3772.1	37046.	37082.	-35.	67	V24
2330	5	12	4.0	12.033	-55.047	3773.0	37052.	37087.	-35.	67	V24
2340	5	12	4.0	12.038	-55.061	3773.8	37052.	37093.	-41.	67	V24
2350	5	12	4.0	12.042	-55.074	3774.7	37058.	37099.	-41.	67	V24
0	6	12	4.0	12.047	-55.088	3775.5	37066.	37105.	-38.	67	V24
10	6	12	4.0	12.051	-55.102	3776.4	37075.	37110.	-35.	67	V24

1535	9	12	4.0	18.429	-62.329	4497.8	42365.	42606.	-241.	67	V24
1540	9	12	4.0	18.437	-62.343	4498.7	42430.	42614.	-183.	67	V24
1543	9	12	4.0	18.441	-62.350	4499.2	42445.	42618.	-173.	67	V24
1545	9	12	4.0	18.444	-62.356	4499.6	42441.	42621.	-179.	67	V24

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C FUNCTION ALATI(Y,SLAT,ANLAT)
C      THIS FUNCTICN CHANGES LATITUDE MERCATOR SCALE TO LINEAR SCALE IN INCHES
C Y IS THE LATITUDE IN DEGREES AND FRACTION
C SLAT IS SOUTH LATITUDE (OF GRID)
C ANLAT IS NORTH LATIUDE (OF GRID)
C THIS FUNCTION REQUIRES THAT MEGRI HAS BEEN PREVIOUSLY CALLED AS IT
C USES THE B(160).
C IT CONVERTS THE ORDINATE Y TO INCHES, GIVING AN ARBITRARY VALUE OF -1.
C IF IT IS OUTSIDE THE GRID.
      FUNCTION ALATI(Y,SLAT,ANLAT)
      COMMONCC(23),B(160)
      IF(Y-SLAT)1,2,2
    2 IF(Y-ANLAT)3,3,1
    3 YA=Y-SLAT+1.
      NY=YA
      YN=NY
      YB=YA-YN
      ALATI=B(NY)+YB*(B(NY+1)-B(NY))
      GO TO 5
    1 ALATI=-1.
    5 RETURN
      END
VARIABLE ALLOCATIONS
    CC(RC)=7FFE-7FD2     B(RC)=7FD0-7E92 ALATI(R )=0000         YA(R )=0002         YN(R )=0004         YB(R )=0006
    NY(I )=0008

STATEMENT ALLOCATIONS
 2    =0021  3    =0028  1    =0058  5    =005D

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FADDX   FSUB    FSUBX   FMPY    FLD     FLDX    FSTO    IFIX    FLOAT   SUBSC   SNR     SUBIN

REAL CONSTANTS
  .100000E 01=000C

CORE REQUIREMENTS FOR ALATI
 COMMON    366  VARIABLES     12  PROGRAM     86
```

```
 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C FUNCTION ALONG(X,WLONG,ELONG,SCALE)
C X IS THE LONGITUDE IN DEGREES AND FRACTION
C WLONG, ELONG, SCALE ARE THE ARGUMENTS DEFINED FOR MEGRI
C      THIS FUNCTION CHANGES LONGITUDE          SCALE TO LINEAR SCALE IN INCHES
C IF OUTSIDE GRID LIMITS VALUE SET TO -1.
      FUNCTION ALONG(X,WLONG,ELONG,SCALE)
      COMMONCC(23),B(160)
      C=X
      IF(C-WLONG)1,2,2
    1 C=C+360.
    2 IF(C-ELONG)3,3,4
    3 ALONG =(C-WLONG)*SCALE
      GO TO 5
    4 ALONG =-1.
    5 RETURN
      END
VARIABLE ALLOCATIONS
    CC(RC)=7FFE-7FD2     B(RC)=7FD0-7E92 ALONG(R )=0000          C(R )=0002

STATEMENT ALLOCATIONS
 1    =001F  2    =0025  3    =002C  4    =0036  5    =003B

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FSUB    FMPY    FLD     FSTO    SNR     SUBIN

REAL CONSTANTS
  .360000E 03=0004    .100000E 01=0006

CORE REQUIREMENTS FOR ALONG
 COMMON    366  VARIABLES      4  PROGRAM     60

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  000C        2005        2005        0000
                          4005        0001

// FOR
*ONE WORD INTEGERS
*LISTALL
C SUBROUTINE AMAY CALLS THE TABLES OF AM AND AY FROM STORAGE.
C THESE ARE RESPECTIVELY THE NUMBER OF ACCUMULATED DAYS IN THE MONTHS
C OF A YEAR AND NUMBER OF ACCUMULATED DAYS IN YEARS STARTING FROM 1960.
      SUBROUTINE AMAY
      DIMENSION AM(12),AY(11)
      COMMON AM,AY
      AM(1)=0.
      AM(2)=31.
      AM(3)=59.
      AM(4)=90.
      AM(5)=120.
      AM(6)=151.
      AM(7)=181.
      AM(8)=212.
      AM(9)=243.
      AM(10)=273.
      AM(11)=304.
      AM(12)=334.
      AY(1)=0.
      AY(2)=366.
      AY(3)=731.
      AY(4)=1096.
      AY(5)=1461.
      AY(6)=1827.
      AY(7)=2192.
      AY(8)=2557.
      AY(9)=2922.
      AY(10)=3288.
      AY(11)=3653.
      RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FLD     FSTOX

REAL CONSTANTS
  .000000E 00=000C    .310000E 02=000E    .590000E 02=0010    .900000E 02=0012    .120000E 03=0014    .151000E 03=0016
```

```
 .181000E 03=0018    .212000E 03=001A    .243000E 03=001C    .273000E 03=001E    .304000E 03=0020    .334000E 03=0022
 .366000E 03=0024    .731000E 03=0026    .109600E 04=0028    .146100E 04=002A    .182700E 04=002C    .219200E 04=002E
 .255700E 04=0030    .292200E 04=0032    .328800E 04=0034    .365300E 04=0036

CORE REQUIREMENTS FOR AMAY
 COMMON     46  VARIABLES     12  PROGRAM    186

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C FUNCTION CATAN (XXN,XXE) TAKES A NORTH VECTOR XXN AND AN EAST VECTOR
C XXE AND COMPUTES IN DEGREES THE ANGLE THAT THE RESULTANT VECTOR MAKES
C WITH NORTH MEASURED IN CLOCKWISE SENSE.
      FUNCTION CATAN(SETN,SETE)
      IF(SETN)5001,5002,5003
 5002 IF(SETE)5006,5004,5004
 5006 COUR=270.
      GO TO 5008
 5004 COUR=90.
      GO TO 5008
 5001 COUR=(3.14159+FATAN(SETE/SETN))*57.29578
      GO TO 5008
 5003 COUR=FATAN(SETE/SETN)*57.29578
 5005 IF(COUR)5007,5008,5008
 5007 COUR=COUR+360.
 5008 CATAN=COUR
      RETURN
      END
VARIABLE ALLOCATIONS
 CATAN(R )=0000       COUR(R )=0002

UNREFERENCED STATEMENTS
 5005

STATEMENT ALLOCATIONS
 5002 =0022  5006 =0027  5004 =002D  5001 =0033  5003 =0044  5005 =0051  5007 =0056  5008 =005C

FEATURES SUPPORTED
 ONE WORD INTEGERS
```

```
CALLED SUBPROGRAMS
 FATAN   FMPY    FDIV    FLD     FSTO    SUBIN

REAL CONSTANTS
  .270000E 03=0006    .900000E 02=0008    .314159E 01=000A    .572957E 02=000C    .360000E 03=000E

CORE REQUIREMENTS FOR CATAN
 COMMON      0  VARIABLES      6  PROGRAM     94

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C SUBROUTINE COMDI(XLAT1,XLON1,XLAT2,XLON2,XXE,XXN,XXD), COMPUTES
C THE DISTANCE XXD BETWEEN POINT 1 WITH COORDINATES XLAT1, XLON1 AND
C POINT 2 WITH COORDINATES XLAT2, XLON2.
C XXN AND XXE ARE THE NORTHWARDS AND EASTWARD COMPONENTS OF XXD.
      SUBROUTINE COMDI(A,B,C,D,XXE,XXN,XXD)
      Q=FCOS((A+C)/114.59156)
      DELW=D-B
      IF(DELW-180.)1,2,3
    3 DELW=DELW-360.
      GO TO 2
    1 IF(DELW+180.)4,2,2
    4 DELW=DELW+360.
    2 XXE=Q*DELW*60.
      XXN=(C-A)*60.
      XXD=FSQRT(XXN**2+XXE**2)
      RETURN
      END
VARIABLE ALLOCATIONS
     Q(R )=0000       DELW(R )=0002

STATEMENT ALLOCATIONS
 3    =0042  1    =004A  4    =0051  2    =0057

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FCOS    FSQRT   FSUB    FMPY    FDIV    FLD     FSTO    FAXI    SUBIN
```

```
REAL CONSTANTS
  .114591E 03=0008    .180000E 03=000A    .360000E 03=000C    .600000E 02=000E

INTEGER CONSTANTS
     2=0010

CORE REQUIREMENTS FOR COMDI
 COMMON      0  VARIABLES      8  PROGRAM    116

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C SUBROUTINE DECID(X1,Y1,X2,Y2,INDEX)
C THIS SUBROUTINE IS USED TO DECIDE WHICH SIDE OF A TRACK ANNOTATIONS
C SHOULD BE MADE (SEE MERGR) IN ORDER TO AVOID CROWDING AND WRITING ON
C TRACK.
C GIVEN TWO POINTS WITH CARTESIAN COORDINATES X1,Y1 AND X2,Y2 IT RETURNS
C A VALUE OF 1,2,3, OR 4 FOR INDEX.
C 1 OR 3 ARE RETURNED IF TRACK IS MORE NORTH-SOUTH.
C 2 OR 4, IF IT IS MORE EAST-WEST.
C PROCEDING ALONG A NORTH-SOUTH TRACK 1 AND 3 WILL RETURN ALTERNATELY.
C CHANGE FROM A 1-3 INDEX TO A 2-4 INDEX IS NOT MADE IF ABS(DELX)/
C ABS(DELY) IS BETWEEN 0.9 AND 1.1.
C INDEX IS USED IN MECHA TO MAKE THE ANNOTATION.
      SUBROUTINE DECID(X1,Y1,X2,Y2,INDEX)
      XZ=FABS(X2-X1)
      YZ=FABS(Y2-Y1)
      IF(XZ-YZ)2,2,1
    1 IND2=2
      GO TO 3
    2 IND2=1
    3 IF(IND2-INDEX)14,5,14
   14 IF(IABS(IND2-INDEX)-2)4,5,4
    4 IF(XZ-.0001)6,7,7
    6 INDEX=IND2
      GO TO 5
    7 IF(FABS((YZ/XZ)-1.)-.1)5,5,6
    5 GO TO(8,9,10,11),INDEX
    8 INDEX=3
      GO TO 12
```

```
    9 INDEX=4
      GO TO 12
   10 INDEX=1
      GO TO 12
   11 INDEX=2
   12 RETURN
      END
VARIABLE ALLOCATIONS
    XZ(R )=0000          YZ(R )=0002        IND2(I )=0006

STATEMENT ALLOCATIONS
 1    =0043  2    =0049  3    =004D  14   =0053  4    =0060  6    =0067  7    =006D  5    =007D  8    =0085  9    =008B
 10   =0091  11   =0097  12   =009B

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FABS    IABS    FSUB    FDIV    FLD     FSTO    SUBIN

REAL CONSTANTS
  .100000E-03=0008    .100000E 01=000A    .100000E 00=000C

INTEGER CONSTANTS
     2=000E      1=000F      3=0010      4=0011

CORE REQUIREMENTS FOR DECID
 COMMON      0  VARIABLES      8  PROGRAM    150

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C FUNCTION DEGFR(LAT,AT) CONVERTS DEGREE AND MINUTE TO DEGREE AND
C FRACTION. LAT IS DEGREES, AT IS MINUTES.
      FUNCTION DEGFR(LAT,AT)
      PAT=LAT
      IF(PAT)1,2,2
    2 PAT=PAT+AT/60.
      GO TO 3
    1 PAT=PAT-AT/60.
    3 DEGFR=PAT
      RETURN
      END
VARIABLE ALLOCATIONS
 DEGFR(R )=0000        PAT(R )=0002

STATEMENT ALLOCATIONS
 2    =0018  1    =0022  3    =002A

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FDIV    FLD     FSTO    FSBR    FLOAT   SUBIN

REAL CONSTANTS
  .600000E 02=0004

CORE REQUIREMENTS FOR DEGFR
 COMMON      0  VARIABLES      4  PROGRAM     46

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C SUBROUTINE DEGMI(XLAT,LAT,AT) CONVERTS DEGREE AND FRACTION XLAT TO
C DEGREE LAT AND MINUTE AT.
      SUBROUTINE DEGMI(A,NNL,XXL)
      INDEX=2
      IF(A)1,2,2
    1 INDEX=1
      C=-A
      GO TO 21
    2 C=A
   21 NNL=C
      B=NNL
      XXL=(C-B)*60.+.05
      GO TO(3,4),INDEX
    3 IF(NNL)5,5,6
    5 XXL=-XXL
      GO TO 4
    6 NNL=-NNL
    4 RETURN
      END
VARIABLE ALLOCATIONS
     C(R )=0000          B(R )=0002      INDEX(I )=0004

STATEMENT ALLOCATIONS
 1    =0026  2    =0031  21   =0035  3    =004F  5    =0053  6    =005A  4    =005F

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FSUB    FMPY    FLD     FSTO    IFIX    FLOAT   SNR     SUBIN

REAL CONSTANTS
  .600000E 02=0006    .500000E-01=0008

INTEGER CONSTANTS
     2=000A      1=000B

CORE REQUIREMENTS FOR DEGMI
 COMMON      0  VARIABLES      6  PROGRAM     92

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
C FUNCTION DELON(Y) TAKES THE DIFFERENCE IN LONGITUDE Y IN DEGREES AND
C ADDS OR SUBTRACTS 360 TO MAKE THE DIFFERENCE LESS THAN 180
      FUNCTION DELON(RLON)
      IF(RLON-180.)1,1,2
    2 DELON=RLON-360.
      GO TO 5
    1 IF(RLON+180.)4,3,3
    4 DELON=RLON+360.
      GO TO 5
    3 DELON=RLON
    5 RETURN
      END
VARIABLE ALLOCATIONS
 DELON(R )=0000

STATEMENT ALLOCATIONS
 2    =0016  1    =001E  4    =0025  3    =002D  5    =0031

CALLED SUBPROGRAMS
 FSUB    FLD     FSTO    SUBIN

REAL CONSTANTS
  .180000E 03=0002    .360000E 03=0004

CORE REQUIREMENTS FOR DELON
 COMMON      0  VARIABLES      2  PROGRAM     52

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
*ARITHMETICTRACE
*TRANSFER TRACE
C      SUBROUTINE DMAG2
C      UPDATED VERSION OF DOMAG TO ACCEPT MAGNETICS DATA FROM DISK STORAGE.
C SUBROUTINE COLLATES NAVIGATION AND THEORETICAL MAGNETIC FIELD STORED
C      ON NAVIGATION FILE WITH OBSERVED DATA ENTERED FROM CARDS OR DISK
C      DMAG2 RETURNS VALUES OF RESIDUAL ANOMALY AND TOTAL OBSERVED FIELD
C      INPUT DATA GIVES TOTAL FIELD OBSERVED IN GAMMAS OR FREQUENCY AS A
C      FUNCTION OF TIME OF OBSERVATION.
C TOTAL FIELD IS TI, RESIDUAL FIELD IS RESID
C       NSS2 NONZERO TO LIST ANSWERS
C CALLED BY PRELIMINARY AND FINAL DATA REDUCTION PROGRAMS, PROJECTION
C PROGRAM MERCATOR PLOTTING PROGRAMS.
C      NSS3 =0 FOR DATA IN GAMMAS,=1 FOR DATA IN PERIOD (VEMA AND CONRAD)
C CALLING PROGRAM MUST GIVE XMIN,XMAX,NSS3,INITIAL VALUE OF JENT=1,
C      INDEX=1,TO BE SPECIFIED IN CALLING PROG., OTHER VARIABLES SPECIFIED BEFORE
C      CALLING DOMAG IF CORRECT VALUES TO BE RETURNED TO MAIN PROG.
C FIRST TIME DMAG2 IS CALLED THESE VARIABLES ARE SET TO ZERO.
C      SETS JENT=3 ON BLANK DAY CARD FOR USE AS EXIT DEVICE
      SUBROUTINE DMAG2(XMIN,XMAX,NSS3,JENT,GLAT,GLONG,GDIS,RESID,INDEX,
     1NSS2,XXE,XXN,XXD,PLAT1,PLNG1,PLAT2,PLNG2,TI,KS)
      DIMENSION THR(9),TMIN(9),C(9),JTIM(9),JG(9)
      COMMON AM(12),AY(11),B(160)
      GO TO(500,501),JENT
  500 CALL AMAY
      KB=1
      JJJ=1
      JK=1
      JENT=2
   20 READ(3'1)DISA,I,DMAX,CRUIS,JBSYR
      IF(JBSYR-1959)7001,7002,7002
 7002 IF(JBSYR-1970)7003,7003,7001
 7001 JBSYR=1959
 7003 CONTINUE
      M=2
      READ(1'1)TNAV1,PLAT1,PLNG1,SETE,TZ,IRES
      RES1=IRES
      RES1=RES1+50000.00
      XXE=0.0
      XXN=0.0
      XXD=0.0
  973 READ(1'M)TNAV2,PLAT2,PLNG2,SETE,TZ,IRES
```

```
      IF(FABS(TZ)-12.)974,974,509
  974 RES2=IRES
      RES2=RES2+50000.00
      CALL COMDI(PLAT1,PLNG1,PLAT2,PLNG2,XXE,XXN,XXD)
      DISB=DISA+XXD
      DOS=(RES2-RES1)/(TNAV2-TNAV1)
  923 DELT=TNAV2-TNAV1
      SPEED=XXD/DELT
 3004 DEM=DELCN(PLNG2-PLNG1)/DELT
 4012 DEN=(PLAT2-PLAT1)/DELT
      GO TO(4797,2221),JK
 4797 NMA=0
      JK=2
  402 KS=KS+1
      IF(NSS3)4713,1777,4713
 1777 READ(15'KS)JDAY,MON,JYR,TZ,LB,LC,JCT,JCY,JOSC,KT
      JCY=0
      JOSC=0
      GO TO 4711
 4713 READ(15'KS)JDAY,MON,JYR,TZ,LB,LC,JCT,JCY,JOSC,KT
 4711 IF(JDAY)4714,509,4714
 4714 AA=TXX(JDAY,MON,JYR,TZ,JBSYR)
      CT=JCT
      CT=1000.*CT
      KB=2
      IF(NSS3)4091,221,4091
 4091 CY=JCY
      OSC=JOSC
      OSC=100000.*OSC
      ANUM=OSC*CY*23.48738
  221 NMX=9*(LB-1)+LC
  222 J=0
      KT=KT+1
      READ(16'KT)(JTIM(I),JG(I),I=1,9)
      DO 2399 I=1,9
      JJHR=JTIM(I)/100
      THR(I)=JJHR
      C(I)=JG(I)
 2399 TMIN(I)=JTIM(I)-JJHR*100
  506 J=J+1
      NMA=NMA+1
 5993 IF(C(J))2225,4779,2225
 4779 IF(NMX-NMA)4797,2225,2225
 2225 TTT=AA+THR(J)+TMIN(J)/60.
      IF(TTT-TNAV1)501,2221,2221
 2221 IF(TTT-TNAV2)223,223,225
  225 PLAT1=PLAT2
      RES1=RES2
      M=M+1
      PLNG1=PLNG2
      TNAV1=TNAV2
```

```
      DISA=DISB
      INDEX=1
      GO TO 973
  223 GLAT=PLAT1+(TTT-TNAV1)*DEN
      GLONG=PLNG1+(TTT-TNAV1)*DEM
      GLONG=DELON(GLONG)
      GDIS=DISA+SPEED*(TTT-TNAV1)
      IF(GDIS-XMIN)501,25,25
   25 IF(GDIS-XMAX)21,21,503
   21 GRES=RES1+(TTT-TNAV1)*DOS
 4047 IF(NSS3)6296,6297,6296
 6297 TI=C(J)+CT
      GO TO 6298
 6296 TI=ANUM/(C(J)+CT)
 6298 RESID=TI-GRES
      KYR=JYR-1900
      LGG=THR(J)*100.+TMIN(J)
      IF(NSS2)555,503,555
  555 WRITE(5,61)LGG,JDAY,MON,TZ,GLAT,GLONG,GDIS,TI,GRES,RESID,KYR,CRUIS
   61 FORMAT(I5,2I3,1X,F5.1,F7.3,F8.3,F8.1,2F8.0,F7.0,I3,A4)
      GO TO 503
  501 IF(NMX-NMA)4797,4797,26
   26 IF(J-9)506,222,222
  710 FORMAT(9(F2.0,F2.0,F4.1))
  509 JENT=3
  503 RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92   THR(R )=0010-0000  TMIN(R )=0022-0012     C(R )=0034-0024
  DISA(R )=0036        DMAX(R )=0038       CRUIS(R )=003A       TNAV1(R )=003C        SETE(R )=003E          TZ(R )=0040
  RES1(R )=0042       TNAV2(R )=0044        RES2(R )=0046        DISB(R )=0048         DOS(R )=004A        DELT(R )=004C
 SPEED(R )=004E         DEM(R )=0050        DEN(R )=0052          AA(R )=0054          CT(R )=0056          CY(R )=0058
   OSC(R )=005A        ANUM(R )=005C        TTT(R )=005E        GRES(R )=0060        JTIM(I )=006C-0064    JG(I )=0075-006D
    KB(I )=0076         JJJ(I )=0077         JK(I )=0078           I(I )=0079       JBSYR(I )=007A          M(I )=007B
  IRES(I )=007C         NMA(I )=007D       JDAY(I )=007E         MON(I )=007F         JYR(I )=0080         LB(I )=0081
    LC(I )=0082         JCT(I )=0083        JCY(I )=0084        JOSC(I )=0085          KT(I )=0086        NMX(I )=0087
     J(I )=0088        JJHR(I )=0089        KYR(I )=008A         LGG(I )=008B

UNREFERENCED STATEMENTS
 20      923     3004    4012    402     5993    4047    710

STATEMENT ALLOCATIONS
 61   =00AA  710  =00B8  500  =0111  20   =0123  7002 =0137  7001 =013E  7003 =0142  973  =016C  974  =0183  923  =01AB
 3004 =01B7  4012 =01C4  4797 =01D1  402  =01D9  1777 =01E4  4713 =0205  4711 =021C  4714 =0221  4091 =023E  221  =0256
 222  =0261  2399 =02A6  506  =02BF  5993 =02CB  4779 =02D5  2225 =02DC  2221 =02F6  225  =02FD  223  =031D  25   =0347
 21   =034E  4047 =0358  6297 =035D  6296 =036A  6298 =0377  555  =0396  501  =03B4  26   =03BB  509  =03C4  503  =03C8

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS
```

```
CALLED SUBPROGRAMS
 AMAY    FABS    COMDI   DELON   TXX     FADDX   FSUB    FMPY    FDIV    FLD     FLDX    FSTO    FDVR    SFAR    SFARX
 SIAR    IFIX    FLOAT   SIIF    SFIF    SGOTO   SWRT    SCOMP   SIOF    SIOI    SUBSC   SUBIN   SDRED   SDIX    SDF
 SDI

REAL CONSTANTS
  .500000E 05=008E    .000000E 00=0090    .120000E 02=0092    .100000E 04=0094    .100000E 06=0096    .234873E 02=0098
  .600000E 02=009A    .100000E 03=009C

INTEGER CONSTANTS
     1=009E      2=009F      3=00A0   1959=00A1   1970=00A2      0=00A3     15=00A4      9=00A5     16=00A6    100=00A7
  1900=00A8      5=00A9

CORE REQUIREMENTS FOR DMAG2
 COMMON    366  VARIABLES    142  PROGRAM    828

 END OF COMPILATION
```



```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*ONE WORD INTEGERS
*LISTALL
*TRANSFER TRACE
*ARITHMETICTRACE
C SUBROUTINE DXX CALCULATES DAY MONTH YEAR HOURS AND MINUTES PROVIDED,
C W, THE TIME IN HOURS FROM JAN 1 OF JBSYR+1,T.Z., AND JBSYR ARE GIVEN.
      SUBROUTINE DXX(W,TZ,JJDY,JJMON,JJYR,JJH,JJMIN,JBSYR)
      DIMENSION AM(12),AY(11)
      COMMON AM,AY
      T=W-TZ
       N=JBSYR-1959+1
      DO 8 M=N,11
      IF(T-(AY(M)-AY(N))*24.)21,8,8
    8 CONTINUE
   21 T=T-(AY(M-1)-AY(N))*24.
      JJYR=M+1958
      JCAT=JJYR/4
      JCAT=JCAT*4
      IF(JCAT-JJYR)81,212,81
  212 DO 13 JRAT=3,12
   13 AM(JRAT)=AM(JRAT)+1.
```

```
   81 DO 9 MM=1,12
      IF(T-AM(MM)*24.)22,9,9
    9 CONTINUE
   22 T=T-AM(MM-1)*24.
      JJMON=MM-1
      IF(AM(3)-59.)91,91,14
   14 DO 15 JRAT=3,12
   15 AM(JRAT)=AM(JRAT)-1.
   91 JJDY=T/24.
      JKDY=JJDY*24
      YDKJ=JKDY
      JJDY=JJDY+1
      H=T-YDKJ
      JJH=H
      HJJ=JJH
      JJMIN=(H-HJJ)*60.+.5
      RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2     T(R )=0000       YDKJ(R )=0002          H(R )=0004        HJJ(R )=0006
     N(I )=0008          M(I )=0009       JCAT(I )=000A       JRAT(I )=000B         MM(I )=000C       JKDY(I )=000D

STATEMENT ALLOCATIONS
 8    =0066  21   =006F  212  =00A2  13   =00A6  81   =00BA  9    =00CC  22   =00D5  14   =00F1  15   =00F5  91   =0109

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FSUB    FSUBX   FMPY    FDIV    FLD     FLDX    FSBR    SFAR    SFARX   SIAR    IFIX    FLOAT   SIIF    SFIF    SUBSC
 SUBIN

REAL CONSTANTS
  .240000E 02=001C    .100000E 01=0012    .590000E 02=0014    .600000E 02=0016    .500000E 00=0018

INTEGER CONSTANTS
  1959=001A      1=001B     11=001C   1958=001D      4=001E      3=001F     12=0020     24=0021

CORE REQUIREMENTS FOR DXX
 COMMON     46  VARIABLES     16  PROGRAM..  304

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C SUBROUTINE MECHA(X,Y,NVAR,IQUA,SIZE)
C X, Y ARE COORDINATES IN INCHES
C NVAR IS VARIABLE UP TO FIVE PLACES (INCLUDING SIGN) TO BE WRITTEN NEXT
C TO POINT (X, Y)
C IQUA IS INDEX 1 THROUGH 4 TO DEFINE POSITION OF WRITING OF VARIABLE
C IF IQUA IS 1,2,3,4 POSITION IS TO RIGHT, ABOVE, LEFT AND BELOW POINT.
C SIZE IS SIZE OF CHARACTERS TO BE DRAWN IN INCHES.
C IF SIZE IS 0, SIZE IS DEFINED AS 0.1.
C CHECKS FOR LENGTH OF WORD TO DRAW AND ADJUST POSITION ACCORDINGLY.
C RETURNS PEN IN UP POSITION
C DOES NOT CHECK IF POINT IS WITHIN GRID
      SUBROUTINE MECHA(X,Y,NVAR,IQUA,SIZE)
      IF(SIZE)6,50,6
   50 SIZE=.1
    6 SS=SIZE/2.
      IF(IABS(NVAR)-10)310,311,311
  310 K=1
      GO TO 32
  311 IF(IABS(NVAR)-100)312,313,313
  312 K=2
      GO TO 32
  313 IF(IABS(NVAR)-1000)314,315,315
  314 K=3
      GO TO 32
  315 IF(IABS(NVAR)-10000)316,317,317
  316 K=4
   32 IF(NVAR)320,321,321
  320 K=K+1
      GO TO 321
  317 K=5
  321 GO TO (322,323,324,325),IQUA
  322 XX=X+SS
      YY=Y-SS
      GO TO 30
  323 XX=X+SS
      YY=Y+SS
      GO TO 30
  324 XX=X-(K+.5)*SIZE
      YY=Y-SS
      GO TO 30
  325 YY=Y-(K+.5)*SIZE
      XX=X+SS
```

```
   30 IF(IQUA-2)3000,3001,3002
 3000 THETA=0.
      GO TO 4
 3001 THETA=1.57079
      GO TO 4
 3002 IF(IQUA-3)3001,3000,3001
    4 CALL FCHAR(XX,YY,SIZE,SIZE,THETA)
      GO TO(40,41,42,43,44),K
   40 WRITE(7,100)NVAR
  100 FORMAT(I1)
      GO TO 5
   41 WRITE(7,101)NVAR
  101 FORMAT(I2)
      GO TO 5
   42 WRITE(7,102)NVAR
  102 FORMAT(I3)
      GO TO 5
   43 WRITE(7,103)NVAR
  103 FORMAT(I4)
      GO TO 5
   44 WRITE(7,104)NVAR
  104 FORMAT(I5)
    5 RETURN
      END
VARIABLE ALLOCATIONS
    SS(R )=0000          XX(R )=0002          YY(R )=0004       THETA(R )=0006           K(I )=0008

STATEMENT ALLOCATIONS
 100  =001E  101  =0020  102  =0022  103  =0024  104  =0026  50   =0051  6    =0055  310  =0062  311  =0068  312  =006F
 313  =0075  314  =007C  315  =0082  316  =0089  32   =008D  320  =0091  317  =0099  321  =009D  322  =00A5  323  =00B3
 324  =00C1  325  =00D4  30   =00E5  3000 =00ED  3001 =00F3  3002 =00F9  4    =0101  40   =0111  41   =0119  42   =0121
 43   =0129  44   =0131  5    =0137

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 IABS    FCHAR   FSUB    FMPY    FDIV    FLD     FSTO    FSBR    FLOAT   SWRT    SCOMP   SIOI    SUBIN

REAL CONSTANTS
  .100000E 00=000A    .200000E 01=000C    .500000E 00=000E    .000000E 00=0010    .157079E 01=0012

INTEGER CONSTANTS
    10=0014      1=0015    100=0016      2=0017   1000=0018      3=0019  10000=001A      4=001B      5=001C      7=001D

CORE REQUIREMENTS FOR MECHA
 COMMON      0  VARIABLES     10  PROGRAM    304

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C MEGRI (WLONG, ELONG, SLAT, ANLAT, SCALE) SUBROUTINE MEGRI DRAWS THE
C OUTLINE OF A MERCATOR GRID GIVEN WLONG, ELONG, SLAT, AND ANLAT THE
C WESTERN, EASTERN, SOUTHERN AND NORTHERN BOUNDARIES RESPECTIVELY
C IN DEGREES AND SCALE IN INCHES PER DEGREE LONGITUDE.
C IT ALSO CALLS SCALF AT ORIGINAL PEN POSITION.
C IT ALSO COMPUTES THE DISTANCE IN INCHES OF THE VARIOUS LATITUDES FROM
C SLAT AND STORES THEM AS B(I).
C I GOES FROM 1 TO (ANLAT-SLAT+1).
C B(1)=0 AND THE B(I) WITH HIGHEST VALUES OF I GIVES THE DISTANCE OF
C ANLAT FROM SLAT.
C THE B(I)'S ARE USED IN ALL MERCATOR SUBROUTINES HENCE MEGRI MUST BE
C CALLED BEFORE ANY OTHER MERCATOR SUBROUTINE.
      SUBROUTINE MEGRI(WLONG,ELONG,SLAT,ANLAT,SCALE)
      DIMENSION A(81)
      COMMONCC(23),B(160)
C     SUBROUTINE SETS MERCATOR GRID ,STORES B(160) IN COMMON,THE FIRST 23
C     PLACES OF THE COMMON AREA ARE RESERVED FOR COMPATIBILITY WITH NAVIGATION P
C     PROGRAMS ,AT BEGINNING OF PROGRAM SCALF IS REDIFINED
C     AN OUTLINE IS DRAWN
C    BLUE CHART SCALE  0.3574
      A(1)=0.9933
      A(2)=0.9937
      A(3)=0.9943
      A(4)=0.9952
      A(5)=0.9964
      A(6)=0.9980
      A(7)=0.9998
      A(8)=1.0020
      A(9)=1.0045
      A(10)=1.0073
      A(11)=1.0105
      A(12)=1.0139
       A(13)=1.0170
      A(14)=1.0219
      A(15)=1.0264
      A(16)=1.0313
      A(17)=1.0365
      A(18)=1.0421
      A(19)=1.0481
      A(20)=1.0545
      A(21)=1.0613
      A(22)=1.0686
```

```
A(23)=1.0762
A(24)=1.0843
A(25)=1.0928
A(26)=1.1019
A(27)=1.1114
A(28)=1.1215
A(29)=1.1320
A(30)=1.1431
A(31)=1.1548
A(32)=1.1671
A(33)=1.1801
A(34)=1.1937
A(35)=1.2079
A(36)=1.2229
A(37)=1.2388
A(38)=1.2552
A(39)=1.2726
A(40)=1.2909
A(41)=1.3101
A(42)=1.3303
A(43)=1.3515
A(44)=1.3739
A(45)=1.3875
A(46)=1.4121
A(47)=1.4482
A(48)=1.4758
A(49)=1.5049
A(50)=1.5356
A(51)=1.5681
A(52)=1.6024
A(53)=1.6388
A(54)=1.6774
A(55)=1.7185
A(56)=1.7621
A(57)=1.8085
A(58)=1.8580
A(59)=1.9108
A(60)=1.9674
A(61)=2.0280
A(62)=2.0932
A(63)=2.1633
A(64)=2.2389
A(65)=2.3208
A(66)=2.4096
A(67)=2.5062
A(68)=2.6118
A(69)=2.7275
A(70)=2.8547
A(71)=2.9954
A(72)=3.1516
A(73)=3.3261
```

```
      A(74)=3.5222
      A(75)=3.7440
      A(76)=3.9924
      A(77)=4.2822
      A(78)=4.6189
      A(79)=5.0145
      A(80)=5.4863
      A(81)=6.0580
      CALL SCALF(1.,1.,0.,0.)
      DLONG=ELONG-WLONG
      IF(DLONG)10,10,11
   10 DLONG=DLONG+360.
      ELONG=WLONG+DLONG
   11 XM=DLONG*SCALE
      LATD=ANLAT-SLAT+1.
      B(1)=0.
      AL=SLAT
      DO 15 J=2,LATD
      BL=AL+1.
      IF(FABS(AL)-FABS(BL))12,12,13
   12 LC=FABS(BL)
      GO TO 14
   13 LC=FABS(AL)
   14 B(J)=B(J-1)+A(LC)*SCALE
      AL=BL
      IF(B(J)-29.0)15,15,16
   15 CONTINUE
      GO TO 17
   16 ANLAT=ANLAT-1.
      GO TO 11
C     SETTING GRID
C     FIRST SET OUTLINE
   17 CALL FPLOT(2,0.,0.)
      CALL FPLOT(0,XM,0.)
      CALL FPLOT(0,XM,B(LATD))
      CALL FPLOT(0,0.,B(LATD))
      CALL FPLOT(-1,0.,0.)
      RETURN
      END
VARIABLE ALLOCATIONS
    CC(RC)=7FFE-7FD2     B(RC)=7FD0-7E92     A(R )=00A0-0000 DLONG(R )=00A2          XM(R )=00A4          AL(R )=00A6
    BL(R )=00A8       LATD(I )=00AC          J(I )=00AD          LC(I )=00AE

STATEMENT ALLOCATIONS
 10   =0375  11   =0381  12   =03B1  13   =03B9  14   =03BF  15   =03E7  16   =03F2  17   =03FA

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 SCALF   FABS    FPLOT   FADDX   FSUB    FMPY    FLD     FLDX    FSTO    FSTOX   FSBR    IFIX    SUBSC   SUBIN
```

```
REAL CONSTANTS
  .993300E 00=00BE    .993700E 00=00C0    .994300E 00=00C2    .995200E 00=00C4    .996400E 00=00C6    .998000E 00=00C8
  .999800E 00=00CA    .100200E 01=00CC    .100450E 01=00CE    .100730E 01=00D0    .101050E 01=00D2    .101390E 01=00D4
  .101700E 01=00D6    .102190E 01=00D8    .102640E 01=00DA    .103130E 01=00DC    .103650E 01=00DE    .104210E 01=00E0
  .104810E 01=00E2    .105450E 01=00E4    .106130E 01=00E6    .106860E 01=00E8    .107620E 01=00EA    .108430E 01=00EC
  .109280E 01=00EE    .110190E 01=00F0    .111140E 01=00F2    .112150E 01=00F4    .113200E 01=00F6    .114310E 01=00F8
  .115480E 01=00FA    .116710E 01=00FC    .118010E 01=00FE    .119370E 01=0100    .120790E 01=0102    .122290E 01=0104
  .123880E 01=0106    .125520E 01=0108    .127260E 01=010A    .129090E 01=010C    .131010E 01=010E    .133030E 01=0110
  .135150E 01=0112    .137390E 01=0114    .138750E 01=0116    .141210E 01=0118    .144820E 01=011A    .147580E 01=011C
  .150490E 01=011E    .153560E 01=0120    .156810E 01=0122    .160240E 01=0124    .163880E 01=0126    .167740E 01=0128
  .171850E 01=012A    .176210E 01=012C    .180850E 01=012E    .185800E 01=0130    .191080E 01=0132    .196740E 01=0134
  .202800E 01=0136    .209320E 01=0138    .216330E 01=013A    .223890E 01=013C    .232080E 01=013E    .240960E 01=0140
  .250620E 01=0142    .261180E 01=0144    .272750E 01=0146    .285470E 01=0148    .299540E 01=014A    .315160E 01=014C
  .332610E 01=014E    .352220E 01=0150    .374400E 01=0152    .399240E 01=0154    .428220E 01=0156    .461890E 01=0158
  .501450E 01=015A    .548630E 01=015C    .605800E 01=015E    .100000E 01=0160    .000000E 00=0162    .360000E 03=0164
  .290000E 02=0166

INTEGER CONSTANTS
     2=0168      0=0169      1=016A

CORE REQUIREMENTS FOR MEGRI
 COMMON    366  VARIABLES    190  PROGRAM    880

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ONE WORD INTEGERS
C SUBROUTINE MEGRW ( IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
C SUBROUTINE TO BE USED ONLY AFTER MEGRI HAS BEEN CALLED FOR DRAWING
C INSIDE GRID, MAKING ANNOTATIONS ETC.
C THREE KINDS OF ANNOTATION SCALES ARE SELECTED, DEPENDING ON WHETHER
C VALUE OF SCALE * IGG IS LESS THAN 1, BETWEEN 1 AND 2 OR GREATER THAN 2
C IGRI = 0 FOR NO INSIDE GRID, 1 FOR LATITUDES ONLY, 2 FOR BOTH
C LATITUDES AND LONGITUDES TO FORM INSIDE GRID.
C GRID LINES ARE AT INTERVALS OF IGG DEGREES.
C IMIN = 0 FOR NO MINUTE MARKS, 1 FOR MARKS ALONG LATITUDE, 2 FOR MARKS
C ALONG LATITUDE AND LONGITUDE.
C NO MINUTE MARKS ARE DRAWN IF SCALE IS LESS THAN 4 INCHES PER DEGREE.
C LATITUDE AND LONGITUDE ARE ANNOTATED AT INTERVALS OF IGG DEGREES
C WHETHER OR NOT THERE IS ANY INSIDE GRID.
C PROGRAM ALSO DRAWS TICK MARKS ALONG BORDER FOR EACH DEGREE OF LATITUDE
C AND LONGITUDE IF THERE IS NO INSIDE GRID OR IF GRID SPACING IS MORE
C THAN 1 DEGREE.
C WLONG, ELONG, SLAT, ANLAT DEFINE IN DEGREES THE WESTERN, EASTERN,
C SOUTHERN AND NOTHERN BOUNDARIES OF GRID.
C SCALE IS NUMBER OF INCHES PER DEGREE LONGITUDE.
      SUBROUTINE MEGRW(IGRI,IMIN,IGG,WLONG,ELONG,SLAT,ANLAT,SCALE)
      COMMON CC(23),B(160)
      IF(IGG)56,56,55
   56 IGG=1
   55 KIG=SLAT/IGG
      TC=SCALE*IGG
      IF(TC-1.)2005,2006,2006
 2005 JGT=1
      GO TO 2007
 2006 IF(TC-2.)2009,2009,2008
 2008 JGT=3
      GO TO 2007
 2009 JGT=2
 2007 GO TO (2010,2011,2012),JGT
 2012 H1=1.30
      H2=0.15
      H3=0.30
      H4=0.75
      H5=-.20
      H6=0.50
      H7=0.20
      GO TO 57
 2011 H1=0.86
```

```
      H2=0.10
      H3=0.20
      H4=0.50
      H5=-.14
      H6=0.33
      H7=0.13
      GO TO 57
 2010 H1=0.44
      H2=0.05
      H3=0.10
      H4=0.25
      H5=-.06
      H6=0.17
      H7=0.07
   57 NNNN=SLAT-KIG*IGG
      IF(NNNN)7000,7000,7001
 7000 NNNN=IGG+NNNN
 7001 KIG=1+IGG-NNNN
      KOG=WLONG/IGG
      NNNN=WLONG-KOG*IGG
      IF(NNNN)7002,7002,7003
 7002 NNNN=IGG+NNNN
7003  KOG=1+IGG-NNNN
      DLONG=ELONG-WLONG
      LONGD=DLONG
      LONGF=LONGD+1
      XM=DLONG*SCALE
      LATD=ANLAT-SLAT+1.
C     TRACE GRID EVERY IGG
      IF(IGRI-1)1100,1000,1010
 1000 IB=KIG
      BC=0.
      BD=XM
      CALL FPLOT(1,BC,B(IB))
      I=-2
 1001 Y=B(IB)
      CALL FPLOT(I,BC,Y)
      I=0
      CALL FPLOT(I,BD,Y)
      AD=BC
      BC=BD
      BD=AD
      IB=IB+IGG
      IF(LATD-IB)1100,1100,1001
 1010 BB=(KOG-1)*SCALE
      BC=0.
      BD=B(LATD)
      CALL FPLOT(1,BB,BC)
      I=-2
 1011 CALL FPLOT(I,BB,BC)
      I=0
```

```
      CALL FPLOT(I,BB,BD)
      AD=BC
      BC=BD
      BD=AD
      BB=BB+IGG*SCALE
      IF(XM   -BB)1000,1000,1011
 1100 IF(SCALE-4.)1200,1901,1901
C     TEST FOR STANDARD SCALE
 1901 IF(IMIN-1)1200,1102,1902
C     DRAW MINUTES MARKS
 1902 DD=SCALE/60.
      DO 1903 K=1,59
      XK=K
      X=DD*XK
      IF(K-30)1904,1905,1904
 1904 KK=XK/10.
      XKK=KK*10
      IF(XK-XKK)1906,1907,1906
 1906 KK=XK/5.
      XKK=KK*5
      IF(XK-XKK)1908,1909,1908
 1908 Y=0.1
      GO TO 1910
 1909 Y=0.12
      GO TO 1910
 1907 Y=0.15
      GO TO 1910
 1905 Y=0.2
      GO TO 1910
 1910 CALL FPLOT(1,X,0.)
 1903 CALL FPLOT(2,X,Y)
 1102 DO 1110 J=2,LATD
      DD=(B(J)-B(J-1))/60.
      DO 1110 K=1,59
      XK=K
      Y=B(J-1)+DD*XK
      IF(K-30)1111,1112,1111
 1111 KK=XK/10.
      XKK=KK*10
      IF(XK-XKK)1113,1114,1113
 1113 KK=XK/5.
      XKK=KK*5
      IF(XK-XKK)1115,1116,1115
 1115 X=0.1
      GO TO 1117
 1116 X=0.12
      GO TO 1117
 1114 X=0.15
      GO TO 1117
 1112 X=0.2
 1117 CALL FPLOT(1,0.,Y)
```

```
 1110 CALL FPLOT(2,X,Y)
C     DRAW DEGREE TICKS AT IGG INTERVA. IF IGRI NON ZERO ONLY DRAW TICKS IF IGG 1
 1200 IF(IGRI)2200,2200,2201
 2200 JJK=0
      GO TO 2202
 2201 JJK=1
 2202 IF(IGG-JJK)1300,1300,1201
 1201 X=0.2
      DO 1202 J=1,LATD
      CALL  FPLOT(1,0.,B(J))
 1202 CALL FPLOT(2,X,B(J))
      Y=B(LATD)-0.2
      DO 1203 J=1,LONGF
      X=(J-1.)*SCALF
      CALL FPLOT(1,X,B(LATD) )
 1203 CALL FPLOT(2,X,Y)
      X=XM-0.2
      DO 1204 J=1,LATD
      JJ=LATD-J+1
      CALL FPLOT(1,XM,B(JJ))
 1204 CALL FPLOT(2,X,B(JJ))
      Y=0.2
      DO 1205 J=1,LONGF
      X=(LONGF-J)*SCALE
      CALL FPLOT(1,X,0.)
 1205 CALL FPLOT(2,X,Y)
C     WRITE DEGREE IDENTIFICATION
 1300 AL=-H1
      DO 2000 NAP=1,2
      DO 1301 J=KIG,LATD,IGG
      LAT=SLAT+J-1
      Y=B(J)-H2
      CALLFCHAR(AL,Y,H3,H3,0.)
 1301 WRITE(7,100)LAT
  100 FORMAT(I4)
 2000 AL=ALONG(ELONG,WLONG,ELONG,SCALE)+H5
      Y=B(LATD)+H7
      DO 2001 NAP=1,2
      DO 1302 J=KCG,LONGF,IGG
      AL=(J-1)*SCALE-H4
      LONG=WLONG+J-1
      LLONG=LONG
      IF(LONG-180)1310,1310,1311
 1311 LLONG=LONG-360
 1310 CALLFCHAR(AL,Y,H3,H3,0.)
 1302 WRITE (7,100)LLONG
 2001 Y=-H6
      CALL FPLOT(-1,0.0,0.0)
      RETURN
      END
VARIABLE ALLOCATIONS
    CC(RC)=7FFE-7FD2     B(RC)=7FC0-7E92    TC(R )=0000         H1(R )=0002         H2(R )=0004         H3(R )=0006
```

```
    H4(R )=0008          H5(R )=000A          H6(R )=000C          H7(R )=000E       DLONG(R )=0010          XM(R )=0012
    BC(R )=0014          BD(R )=0016           Y(R )=0018          AD(R )=001A          BB(R )=001C          DD(R )=001E
    XK(R )=0020           X(R )=0022         XKK(R )=0024          AL(R )=0026         KIG(I )=002C         JGT(I )=002D
  NNNN(I )=002E         KOG(I )=002F       LONGD(I )=0030       LONGF(I )=0031        LATD(I )=0032          IB(I )=0033
     I(I )=0034           K(I )=0035          KK(I )=0036           J(I )=0037         JJK(I )=0038          JJ(I )=0039
   NAP(I )=003A         LAT(I )=003B        LONG(I )=003C       LLONG(I )=003D

STATEMENT ALLOCATIONS
 100  =007D  56   =00B8  55   =00BC  2005 =00D2  2006 =00D8  2008 =00DF  2009 =00E5  2007 =00E9  2012 =00F0  2011 =010F
 2010 =012F  57   =014B  7000 =015A  7001 =0160  7002 =017F  7003 =0185  1000 =01B5  1001 =01D5  1010 =0206  1011 =0226
 1100 =0252  1901 =0259  1902 =0261  1904 =027C  1906 =0292  1908 =02A8  1909 =02AE  1907 =02B4  1905 =02BA  1910 =02C0
 1903 =02C5  1102 =02D3  1111 =0309  1113 =031F  1115 =0335  1116 =033B  1114 =0341  1112 =0347  1117 =034B  1110 =0350
 1200 =0367  2200 =036B  2201 =0371  2202 =0375  1201 =037B  1202 =0392  1203 =03D1  1204 =0400  1205 =042E  1300 =043C
 1301 =046A  2000 =047A  1311 =04C4  1310 =04CA  1302 =04D1  2001 =04E1

FEATURES SUPPORTED
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FPLOT   FCHAR   ALONG   FADDX   FSUB    FSUBX   FMPY    FDIV    FLD     FLDX    FSTO    FSBR    FDVR    IFIX    FLOAT
 SWRT    SCOMP   SIOI    SUBSC   SNR     SUBIN

REAL CONSTANTS
  .100000E 01=004C    .200000E 01=0042    .130000E 01=0044    .150000E 00=0046    .300000E 00=0048    .750000E 00=004A
  .200000E 00=004C    .500000E 00=004E    .860000E 00=0050    .100000E 00=0052    .140000E 00=0054    .330000E 00=0056
  .130000E 00=0058    .440000E 00=005A    .500000E-01=005C    .250000E 00=005E    .600000E-01=0060    .170000E 00=0062
  .700000E-01=0064    .000000E 00=0066    .400000E 01=0068    .600000E 02=006A    .100000E 02=006C    .500000E 01=006E
  .120000E 00=0070

INTEGER CONSTANTS
     1=0072      3=0073      2=0074      0=0075     59=0076     30=0077     10=0078      5=0079      7=007A    180=007B
   360=C07C

CORE REQUIREMENTS FOR MEGRW
 COMMON     366  VARIABLES     64  PROGRAM   1212

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
C SUBROUTINE MEPLC(I,X,Y)
C I HAS SAME FUNCTION AS I IN FPLOT
C X AND Y ARE COORDINATES OF POINT IN INCHES
C MOVES THE PEN BY FPLOT (I, X, Y)
C TRACES AND  X  IN A .04 INCH SQUARE
C LEAVES THE PEN UP
C DOES NOT CHECK IF POINT IS WITHIN GRID
      SUBROUTINE MEPLC(I,X,Y)
C     PEN IS RAISED ,MOVED TO LOCATION,AT END RETURNED TO LOCATION UP
      X3=X+0.02
       X2=X-0.02
       Y3=Y+0.02
      Y2=Y-0.02
      CALL FPLOT(I,X,Y)
      CALL FPLOT(1,X2,Y3)
      CALL FPLOT(2,X3,Y2)
      CALL FPLOT(1,X2,Y2)
      CALL FPLOT(2,X3,Y3)
      CALL FPLOT(1,X,Y)
    1 RETURN
      END
VARIABLE ALLOCATIONS
    X3(R )=0000         X2(R )=0002         Y3(R )=0004         Y2(R )=0006

STATEMENT ALLOCATIONS
 1     =0053

CALLED SUBPROGRAMS
 FPLOT   FSUB    FLD     FSTO    SUBIN

REAL CONSTANTS
  .200000E-01=0008

INTEGER CONSTANTS
     1=000A      2=000B

CORE REQUIREMENTS FOR MEPLO
 COMMON      0  VARIABLES      8  PROGRAM     78

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*TRANSFER TRACE
*LISTALL
*ARITHMETICTRACE
C      MERGP IS USED IN PLOTTING VALUES ALONG TRACK ON A MERCATOR
C      PROJECTION
C GLAT, ALONG, FA GIVE THE LATITUDE, LONGITUDE AND VALUE OF VARIABLE
C      TO BE PLOTTED.
C WLONG, ELONG, SLAT, AND LAT GIVE COORDINATES AND SCALE GIVEN INCHES
C PER DEGREE LONGITUDE OF GRID.
C      YYM=ALATI(ANLAT,SLAT,ANLAT), THAT IS Y DISTANCE OF NORTHERN
C BOUNDARY OF GRID IN INCHES.
C PLAT 1, PLNG 1, PLAT 2, PLNG 2 ARE COORDINATE OF THE TWO NAVIGATION
C POINTS BETWEEN WHICH THE PLOTTED POINT LIES.
C XXE,XXN,XXD ARE THE EASTWARD DISTANCE, NORTHWARD DISTANCE AND TOTAL
C DISTANCE BETWEEN THE TWO NAVIGATION POINTS.
C PLOT IS SCALED AT ONE INCH = SCALX UNITS.
C THE PLOT IS CONTINUED YLOW INCHES BELOW THE SOUTH BOUNDARY OF THE GRID
C AND YHIGH INCHES ABOVE THE NORTH BOUNDARY.
C IF NSP1 = 0 TRACK IS ALSO PLOTTED
C IF NSP2 = 0 A CROSS IS PLOTTED AT THE VALUE AT EACH NAVIGATION POINT
C IF NSP3 = 0 VALUE IS PLOTTED AT RIGHT ANGLES TO THE TRACK.
C IF IT IS NON ZERO THE VALUE IS PLOTTED ALONG THE ANGLE THETA.
C SAME CONVENTION FOR THETA AS IN FCHAR SUBROUTINES.
C THETA IS IN RADIANS BUT THE MAIN PROGRAMS USUALLY ENTER THETA IN
C DEGREES.
C INDEX = 1 WHEN A NEW NAVIGATION POINT IS GIVEN TO THIS SUBROUTINE
C S IS SET=0 BY MAIN PROGRAM BEFORE MERGP IS CALLED THE FIRST TIME.
C SCALX GIVES NUMBER OF UNITS OF VARIABLE PER INCH FOR PLOTTING.
C IX IS SET = 1 OR 0 ACCORDING AS WHETHER THE VALUE IS PLOTTED BY THE
C SUBROUTINE OR NOT.
      SUBROUTINE    MERGP(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,YYM
     1  ,PLAT1,PLNG1,PLAT2,PLNG2,INDEX,XXE,XXN,SCALX,YLOW,YHIGH,IX,XXD,
     2S,NSP1,NSP2,NSP3,THET)
      IF(XXE)501,502,501
  502 XXE=0.00001
  501 IF(XXN)503,504,503
  504 XXN=0.00001
  503 CONTINUE
      GO TO(1,2),INDEX
    1 Y1=ALATI(PLAT1,SLAT,ANLAT)
      Y2=ALATI(PLAT2,SLAT,ANLAT)
      X1=ALONG(PLNG1,WLONG,ELONG,SCALE)
      X2=ALONG(PLNG2,WLONG,ELONG,SCALE)
      IF(Y1)3,4,4
```

```
    4 IF(Y2)3,57,57
   57 IF(X1)3,58,58
   58 IF(X2)3,7,7
    7 IF(NSP1)71,72,71
   72 CONTINUE
      CALL FPLOT(1,X1,Y1)
      CALL FPLOT(2,X2,Y2)
      CALL FPLOT(1,X2,Y2)
   71 IF(S)31,32,31
   31 CALL FPLOT(-2,XX,YY)
      IF(NSP2)3,312,3
  312 CALL POINT(0)
      GO TO 3
   32 S=1.
    3 INDEX=2
      R1=FABS(XXE/XXD)
      R2=FABS(XXN/XXD)
    2 YY=ALATI(GLAT,SLAT,ANLAT)
      XX=ALONG(GLONG,WLONG,ELONG,SCALE)
      IF(YY)10,77,77
   77 IF(XX)10,11,11
   11 IF(NSP3)112,111,112
  112 YY=YY+(FA/SCALX)*FSIN(THET)
      XX=XX+(FA/SCALX)*FCOS(THET)
      GO TO 113
  111 CONTINUE
      YY=YY+(FA/SCALX)*R1
      XX=XX-(FA/SCALX)*R2*(XXN/FABS(XXN))*(XXE/FABS(XXE))
  113 IF(YY+YLOW)10,13,13
   13 IF(YY-YYM-YHIGH)14,14,10
   14 CALL FPLOT(-2,XX,YY)
      IX=1
      GO TO 27
   10 IX=0
   27 RETURN
      END
VARIABLE ALLOCATIONS
    Y1(R )=0000          Y2(R )=0002          X1(R )=0004          X2(R )=0006          XX(R )=0008          YY(R )=000A
    R1(R )=000C          R2(R )=000E

STATEMENT ALLOCATIONS
 502  =0077  501  =007B  504  =0080  503  =0084  1    =0089  4    =00AC  57   =00B1  58   =00B6  7    =00BB  72   =00C0
 71   =00CF  31   =00D4  312  =00E3  32   =00E8  3    =00EC  2    =0106  77   =011A  11   =011F  112  =0124  111  =0144
 113  =016A  13   =0171  14   =017A  10   =018A  27   =018E

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE

CALLED SUBPROGRAMS
 ALATI   ALONG   FPLOT   POINT   FABS    FSIN    FCOS    FSUB    FMPY    FDIV    FLD     FSTO    FSBR    FDVR    SFAR
```

```
 SIAR    SIIF    SFIF    SGOTO   SUBIN

REAL CONSTANTS
  .100000E-04=0014    .100000E 01=0016

INTEGER CONSTANTS
     1=0018      2=0019      0=001A

CORE REQUIREMENTS FOR MERGP
 COMMON      0  VARIABLES     20  PROGRAM    380

 END OF COMPILATION




// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*ARITHMETICTRACE
*TRANSFERTRACE
C SUBROUTINE MERGP(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,SIZE,XFRE,
C YFRE,INDEX,IX) IS USED TO ANNOTATE DATA ALONG TRACK ON MERCATOR CHART.
C USED IN PROGRAMS METC8, MGRA6, AND MGGG8
C FOR GLAT THROUGH SCALE, SEE MERGP.
C SIZE IS SIZE OF ANNOTATIONS.
C XFRE,YFRE ARE POSITIONS OF PREVIOUS POINT IN INCHES.
C INDEX IS OBTAINED BY DECID AND USED BY MECHA.
C SEE THESE SUBROUTINES
C MERGR RETURNS IX=1,IX=0 ACCORDING AS A VALUE IS PLOTTED AND ANNOTATED
C OR NOT.
C DUMMY VALUES OF XFRE, YFRE, INDEX AN ENTERED INTO SUBROUTINE, FIRST
C TIME IN.
      SUBROUTINE MERGR(GLAT,GLONG,FA,WLONG,ELONG,SLAT,ANLAT,SCALE,SIZE,X
     1FRE,YFRE,INDEX,IX)
      COMMON AM(12),AY(11),B(160)
      Y=ALATI(GLAT,SLAT,ANLAT)
      IF(Y)2,3,3
    3 X=ALONG(GLONG,WLONG,ELONG,SCALE)
      IF(X)2,4,4
    4 CALL DECID(XFRE,YFRE,X,Y,INDEX)
      X3=X+SIZE*0.4
      X2=X-SIZE*0.4
      Y3=Y+SIZE*0.4
```

```
      Y2=Y-SIZE*0.4
      CALL FPLOT(-2,X2,Y2)
      CALL FPLOT(-1,X3,Y3)
      CALL FPLOT(-2,X3,Y2)
      CALL FPLOT(-1,X2,Y3)
      IF(FA)5,5,6
    5 NVAR=FA-0.5
      GO TO 7
    6 NVAR=FA+0.5
    7 CALL MECHA(X,Y,NVAR,INDEX,SIZE)
      IX=1
      GO TO 8
    2 IX=0
    8 XFRE=X
      YFRE=Y
      RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8     AY(RC)=7FE6-7FD2     B(RC)=7FD0-7E92     Y(R )=0000          X(R )=0002          X3(R )=0004
    X2(R )=0006          Y3(R )=0008          Y2(R )=000A         NVAR(I )=000E

STATEMENT ALLOCATIONS
 3    =004D  4    =005A  5    =00AE  6    =00B7  7    =00BE  2    =00CB  8    =00CF

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE

CALLED SUBPROGRAMS
 ALATI   ALONG   DECID   FPLOT   MECHA   FSUB    FMPY    FLD     FSBR    SFAR    SIAR    IFIX    SFIF    SUBIN

REAL CONSTANTS
  .400000E 00=001C    .500000E 00=0012

INTEGER CONSTANTS
     2=0014      1=0015      0=0016

CORE REQUIREMENTS FOR MERGR
 COMMON    366  VARIABLES     16  PROGRAM    202

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*TRANSFERTRACE
*ARITHMETICTRACE
*ONE WORD INTEGERS
C TROJ2 FOR PROJECTION AND PLOTTING USED WITH MGPR2,NAGS1,AND NATS2
      SUBROUTINE TROJ2(XLAT,XLON,GDIS,FA,IND1,ANGLE,XMIN,XMAX,VLAT,
     1  VLON,IS2,XKM,ZINCH,XSCAL,ZSCAL,FAC,SSPR,SSPU,SSPL)
      DIMENSION  XV(6),LV(6)
      IF(IND1)7,8,7
    8 RLAT=VLAT*.01745
      ST=FSIN(ANGLE*.01745)
      CT=FCOS(ANGLE*.01745)
      SS=FSIN(RLAT)
      J=1
      IND1=1
    7 IF(GDIS-XMIN)2071,2,2
    2 IF(GDIS-XMAX)3,3,213
    3 DLAT=XLAT-VLAT
      DLON=XLON-VLON
      DLON=DELON(DLON)
      IF(FABS(DLAT)-1.)2190,2191,2191
 2191 RL=XLAT*.01745
      CO=(FSIN(RL)-SS)/(RL-RLAT)
      DLON=DLON*CO
      GO TO 2192
 2190 DLON=DLON*FCOS(XLAT*0.01745)
 2192 X=(DLON*ST+DLAT*CT)*111.2
      KVAL=FA*10.
      IF(J-1)221,221,222
  221 WRITE(4'J)X,KVAL
      J=J+1
      XP=X
      IF(IS2)224,223,224
  223 KB=1
      GO TO 216
  224 KB=2
      GO TO 216
  222 GO TO(225,226),KB
  225 IF(X-XP)216,216,227
  226 IF(X-XP)227,216,216
  227 WRITE(4'J)X,KVAL
      J=J+1
      XP=X
  216 GO TO 2071
```

```
 213 JJ=J-1
     JK=JJ/2
     GO TO(228,229),KB
 229 KC=-1
     K=JJ+1
     READ(4'JJ)XCN
     READ(4'1)XC
     GO TO 2280
 228 KC=1
     K=0
     READ(4'1)XON
     READ(4'JJ)XC
2280 WRITE(1,710)
 710 FORMAT(16HSET PUNCH HOPPER)
     PAUSE
     IND=1
     IF(SSPR)500,501,500
 500 WRITE(5,706)JJ,VLAT,VLON,XON,XO,       ANGLE
 501 IF(SSPU)502,503,502
 502 WRITE(2,706)JJ,VLAT,VLON,XON,XO,       ANGLE
 503 IF(SSPL)504,900,504
 504 XOX=XKM/XSCAL
      ZZNCH=ZINCH-1.
     CALL FCHAR(XOX,ZZNCH,0.1,0.1,0.)
     WRITE(7,721)JJ,VLAT,VLON,XON,XO,ANGLE
     ZYNCH=ZINCH-1.2
     CALL FCHAR(XOX,ZYNCH,0.1,0.1,0.)
     WRITE(7,722)XKM,ZINCH,XSCAL,ZSCAL,FAC
 722 FORMAT(F8.1,F5.1,F6.1,F6.1,F6.1)
     CALL FPLOT(-1,XOX,ZINCH)
 900 DO 9 I=1,6
     K=K+KC
     IF(K)9998,9998,9100
9100 IF(JJ-K)9998,91,91
  91 READ(4'K)XD,LV(I)
     XV(I)=XC
   9 M=I
     GO TO 9997
9998 IND=2
9997 CONTINUE
     IF(SSPR)505,506,505
 505 WRITE(5,707)(XV(I),        LV(I),I=1,M)
 506 IF(SSPU)507,508,507
 507 WRITE(2,707)(XV(I),        LV(I),I=1,M)
 508 IF(SSPL)509,510,509
 509 IF(FAC)200,100,200
 100 FAC=1.
 200 DO 511 I=1,M
     X=(XV(I)+XKM)/XSCAL
     Z=LV(I)
     Z=Z/FAC
```

```
      Z=(Z/ZSCAL)+ZINCH
      IF(Z-28.5)21,20,20
   21 CALL FPLOT(-2,X,Z)
   20 CONTINUE
  511 CONTINUE
  510 GO TO (900,2079),INC
 2079 IND1=2
 2071 RETURN
  706 FORMAT(11H NO.POINTS=I5,6HM.LAT=F8.3,7HM.LONG=F9.3,5HXMIN=F7.1,
     15HXMAX=F7.1, 4HAZM=F6.0)
  707 FORMAT(1H 6(F7.1,I6))
  721 FORMAT(I5,F7.3,F8.3,F8.1,F8.1,F7.1)
      END
VARIABLE ALLOCATIONS
    XV(R )=000A-0000  RLAT(R )=000C        ST(R )=000E        CT(R )=0010        SS(R )=0012        DLAT(R )=0014
  DLON(R )=0016        RL(R )=0018        CO(R )=001A         X(R )=001C        XP(R )=001E        XON(R )=0020
    XO(R )=0022       XOX(R )=0024     ZZNCH(R )=0026    ZYNCH(R )=0028        XD(R )=002A          Z(R )=002C
    LV(I )=0035-0030     J(I )=0036     KVAL(I )=0037       KB(I )=0038        JJ(I )=0039         JK(I )=003A
    KO(I )=003B          K(I )=003C      IND(I )=003D        I(I )=003E         M(I )=003F

STATEMENT ALLOCATIONS
 710  =005A  722  =0064  706  =006A  707  =008C  721  =0093  8    =00E7  7    =0110  2    =0117  3    =011E  2191 =0137
 2190 =0154  2192 =0161  221  =017F  223  =0196  224  =019C  222  =01A2  225  =01A7  226  =01B0  227  =01B7  216  =01C9
 213  =01CB  229  =01DD  228  =01F4  2280 =0206  500  =0215  501  =0225  502  =022A  503  =023A  504  =023F  900  =0267
 9100 =0296  91   =029D  9    =02B2  9998 =02C1  9997 =02C5  505  =02CA  506  =02E8  507  =02ED  508  =030B  509  =0310
 100  =0315  200  =0319  21   =0349  20   =0353  511  =0353  510  =035C  2079 =0361  2071 =0365

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FSIN    FCOS    DELON   FABS    FCHAR   FPLOT   FSUB    FMPY    FDIV    FLD     FLDX    FSTO    FDVR    SFAR    SFARX
 SIAR    IFIX    FLOAT   SIIF    SFIF    SGOTO   SWRT    SCOMP   SIOFX   SIOIX   SIOF    SIOI    SUBSC   PAUSE   SUBIN
 SDRED   SDWRT   SDCOM   SDIX    SDF     SDI

REAL CONSTANTS
  .174500E-01=0042    .100000E 01=0044    .111200E 03=0046    .100000E 02=0048    .100000E 00=004A    .000000E 00=004C
  .120000E 01=004E    .285000E 02=0050

INTEGER CONSTANTS
     1=0052      4=0053      2=0054      0=0055      5=0056      7=0057      6=0058      0=0059

CORE REQUIREMENTS FOR TROJ2
 COMMON      0  VARIABLES     66  PROGRAM    806

 END OF COMPILATION
```

```
// JOB

LOG DRIVE   CART SPEC   CART AVAIL  PHY DRIVE
  0000        2005        2005        0000
                          4005        0001

// FOR
*LISTALL
*TRANSFER TRACE
*LISTALL
*ARITHMETICTRACE
*ONE WORD INTEGERS
      FUNCTION TXX(JDAY,MON,JYR,TZ,JBSYR)
C TXX COMPUTES TIME TO 0000 HRS OF GIVEN DAY MONTH YEAR FROM JAN 1 OF
C JBSYR+1. FOR EXAMPLE IF JBSYR =1963, TIMES ARE CALCULATED FROM JAN1
C OF 1964
      DIMENSION AM(12),AY(11)
      COMMON AM,AY
      N=JBSYR-1959+1
      DAY=JDAY-1
      JA=JYR-1959
      AA=(AY(JA)+AM(MON)+DAY-AY(N))*24.+TZ
      TXX=AA
      IF(JA-1)1,12,11
   11 IF(JA-5)1,12,13
   13 IF(JA-9)1,12,1
   12 IF(MON-2)1,1,14
   14 TXX=AA+24.
    1 RETURN
      END
VARIABLE ALLOCATIONS
    AM(RC)=7FFE-7FE8    AY(RC)=7FE6-7FD2   TXX(R )=0000        DAY(R )=0002         AA(R )=0004          N(I )=0006
    JA(I )=0007

STATEMENT ALLCCATIONS
 11   =0064  13   =006D  12   =0074  14   =007B  1    =0081

FEATURES SUPPORTED
 TRANSFER TRACE
 ARITHMETIC TRACE
 ONE WORD INTEGERS

CALLED SUBPROGRAMS
 FADDX   FSUBX   FMPY    FLD     FLDX    SFAR    SIAR    FLOAT   SIIF    SUBSC   SUBIN

REAL CONSTANTS
  .240000E 02=000C

INTEGER CONSTANTS
  1959=000E      1=000F      5=0010      9=0011      2=0012

CORE REQUIREMENTS FOR TXX
 COMMON     46  VARIABLES     12  PROGRAM    122
```

END OF COMPILATION

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A system of programs for the reduction and display of Gravity, Topographic, and Magnetic data acquired underway at sea is described. Special attention is given to the problem of storage and acquisition of the data.

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Security Classification

Security Classification

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Marine geophysics						

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